Taken with DALLMEYER'S LONG FOCUS RAPID LANDSCAPE LENS from same standpoint as opposite view, showing effect of different focus lenses.

Taken with DALLMEYER'S WIDE ANGLE LANDSCAPE LENS
from same standpoint as opposite view, showing
effect of different focus lenses.

The International Annual of Anthony's Photographic Bulletin.

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PREFACE.

The volume of the INTERNATIONAL ANNUAL for 1888 having met with such unexpected favor in the eyes of both professional and amateur photographers, both editors and publishers are satisfied that the volume was opportune in its appearance, and has gained a place hitherto unoccupied by any similar publication. The readers of last year's volume will find among our contributors many old friends, and not a few who are new devotees to our art and contribute generously to the advancement of photography. The professional photographer will find items of practical information from the veterans, and the amateur can gather from the papers of his eminent confreres many excellent suggestions that will serve his purpose.

To all our kind and generous friends who have contributed to the present volume we tender our best thanks. We are very glad to be the means of collecting together yearly, the thoughts, practical suggestions, and progressive ideas of so many men eminent in our art and who are located in every clime. We might almost say that the sun never sets upon the staff of the ANNUAL, its members are situated in so many parts of the globe.

We would draw attention to the increase in the number of tables at the end of the volume. These have been added with the idea that they will prove useful to both professional and amateur photographers.

The illustrations give a good idea of the present status of the art in the various methods of printing. Those who have furnished the illustrations have kept fully up to the times in this special field of labor, and their work is a monument to the patient industry that has developed photographic and photo-mechanical printing.

As usual, our publishers have labored earnestly with us to make the volume worthy of the eminent contributors whose names are found in its pages, and a credit to themselves; they have our sincere thanks.

Our readers must judge for themselves if we have done our duty. And should the results of our labors be found worthy in their eyes, we shall feel happy in the thought that we have marshaled such a goodly band of workers in the photographic cause.

ARTHUR H. ELLIOTT,
New York, U. S. A.

W. JEROME HARRISON,
Birmingham, England.

JUNE, 1889.

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PRINTED ON BRADFISCH ARISTOTYPE PAPER.

A STUDY

BY

FALK.

THE
INTERNATIONAL ANNUAL
—OF—
ANTHONY'S PHOTOGRAPHIC BULLETIN.

JUNE, 1889.

SMALL AND LARGE.

By William Adcock.

To-day the extremes in size each have advocates. The "detective" is in full bloom. There is a little rage for it, as for a new rose, or a new song. Its plate, varying from an inch and a half to three inches square, is considered by its workers to have a special advantage in the necessity of enlarging from it. To many such persons enlarging may have a charm—the process may be a fascination. It is the creation of a large thing from a lesser. It seems the production of important sized work with portable apparatus. It seems the avoidance of a costly set, and so engaging to many appears this snatching of fleeting bits, that the sneers of those who call the camera a toy and deride the outlay of a dozen pounds as folly, are disregarded.

On the other hand, are some whom ordinary sizes fail to satisfy. The halves and whole plates so prevalent are held incapable of holding pictures suitable for any but album mounting. For a picture to be framed and hung where it can be effectively seen a yard or more away, you must have large work, and it can only be got good by being direct. To these persons enlargement, especially of the figure, is abomination. It is denounced right and left. Heads approaching, or fully four-fifths life size are an eagle aim. The devotees to size do not deny that apparatus befitting their object is expensive. At the same time, they assert that for studio work a camera is easily and cheaply improvised

by a series of boxes, the largest terminating with the dark slide and focus glass. These boxes sliding within each other, make focus attainable and a black cloth thrown over joints gives security against light. A village carpenter rigged up a camera I saw, for large direct work 23x20, at a cost of forty shillings, and it answered perfectly.

I think both advocates have some claim to be heard. The hand camera has its use. It snatches what would otherwise with difficulty be got, and to those who only want a single print, enlargement may give what satisfies. To the painter, and to him chiefly, are these things, far as I think, of much value. By them he can get the actual characteristics he wants and utilize them in his work. To him, a rough enlargement of eight or more diameters is of as much use as a sharply focussed copy, but beyond him, beyond the use for drawing from, I see little that would induce me to use a hand camera.

With the advocates of large direct work, I range myself and have practiced it several years. I was not ruined by my outfit, a thirty-three inch focus, rapid rectilinear, by a maker second to none, is my lens and the go-within-each-other boxes, my camera. After practising as an amateur thirty years, this large direct work gives me pleasure over all other. Very quick plates balance the disadvantage of a slow type of lens, and I find in practice that I seldom sacrifice a large plate in working, whereas probably from less careful manipulation my stock of small wastes increases weekly.

By the time this appears, it will be known to many I have lately advocated the possession by the camera club and photographic societies generally, of the best attainable apparatus for large direct work, and suggest this should be available for use by members at the club studio on payment of fixed fees. I am sanguine enough to think the idea will be adopted and that it will lead to the production of larger, finer, because more thoughtful and artistic work than has been yet seen.

PHOTOGRAPHING THE INTERIOR OF A CAVE.

By W. I. Lincoln Adams.

On a pleasant afternoon during last October I had the pleasure to conduct a small party—all enthusiastic photographers—to a

picturesque spot in the Orange Mountains, New Jersey, where, concealed, is a cave, which, from the wonderful stories connected with it of Captain Kidd's buried treasure, etc., possesses considerable local interest and fame.

We rode to within a short distance of its hidden entrance, and then proceeded through the woods, up the hillside, afoot. The "cave," so-called, is really a long oblique cleft in the trap rock, opening near the top of the hill in the form of a narrow slit, perhaps twenty feet long, and extending downward at an angle of somewhat more than forty-five degrees, about one hundred feet. Its external orifice is so perfectly concealed in the undergrowth and by the peculiar character of the surface of the hill, that it is only after the most careful search that it can be discovered. Even the school boys, who resort thither frequently during the holidays of Summer, and know exactly at what part of the hill this cave is located, find it difficult to find, and rarely can go directly to its entrance. No wonder at the stories connected with it! No better place could be selected to secrete ill-gotten gains. Our object, however, was to photograph—not to search for hidden treasure—its mysterious interior.

The descent is made by stages, twenty or twenty-five feet in length, and the first stage is most difficult to make. There is one place ("Fat Men's Misery"), so very narrow and low that it is only by lying at one's full length and *sliding* through, that a passage can be effected. Anything larger than a quarter-size "detective" camera is, therefore, out of question for photographing in this cave. Once having passed this narrowest part of the entrance, and having fairly emerged in the darkness beyond, the descent is made with less difficulty, for the walls of the chasm grow further apart as they descend, and the incline is less precipitous. By placing one's back firmly against one wall and stepping on the projections of rock opposite, one can proceed cautiously and safely. The way is lighted by a small candle with which each of the party is supplied. The precious camera and plates we pass along from one to another as the more difficult descents are made, until finally all the party have reached the lowest point of the cavern. Here it widens to a chamber of six or eight feet, and extends twenty or twenty-five feet in length. Beyond this lowest chamber, and a little above it, is another smaller apartment which is reached by crawling upward through a short kind of tunnel. From this remotest chamber a good view

may be had of the main gallery of the chasm; and here we decided to make our first exposure.

The magnesium was supported on a flat stone, which was picked up from the bottom of the cave by one of the party, while another held the reflecting screen behind it (the reflecting screen was a piece of cardboard, about two by three feet in size, which could be rolled up and carried in the belt of one of the party), a third ignited the magnesium at the word of him who presided at the camera. About one hundred grains of magnesium were used and a quick brand of plate. A wide angle lens with full aperture was employed. This objective took in a larger portion of the cave, of course, and made the distance appear greater than a longer-focussed and lesser-angled lens would have done. At the sudden flash of the intense blue light, where darkness had reigned since the mountain was brought forth, the bats and other gloomy inhabitants of the cave seemed somewhat surprised; but we descended quickly to the lower chamber, and, reversing the holder, were ready for a second exposure before the smoke from the first had reached the roof of the cavern and was descending. Making another exposure, we repacked the camera, rolled up the reflecting screen and made our ascent.

On emerging in the upper air, hatless and bedraggled, though the mist had gathered with the setting sun, and it threatened shortly to rain, we were all struck with the remarkable warmth and *dryness* of the air. Returning to our horses, where we left them at the "Sportsman's Inn," near the foot of the hill, we remounted, and, in the gathering gloom faced homeward.

THE PHOTOGRAPHIC ART.—DOES IT ADVANCE OR RETROGRADE.

By an Ancient.

In the beginning, and it is generally supposed there was a starting point, although difficult to trace the exact date, certain results were obtained by manipulations of chemicals that were acted upon by exposure to light, and the result fixed upon the plate to be a delight to succeeding generations. To look upon some of the early daguerreotypes, and compare them with many that were made years later, they do not suffer by such comparison, but *au contraire,* it is the one made with more perfect

apparatus, better constructed lens, and backed by years of experiment, that appears to be the less perfect, in color and detail. This, of course, cannot be said of all, but in the early days of the art there were no shelves of books on every subject to run to and few to consult. Instructions were given in few and simple terms, occupying, perhaps, not over one entire day in making a full fledged daguerrean artist from a beginner, who would then purchase his outfit for about $60 and start on the road. The debates over position, lighting, expression, etc., were the exception and not the rule. As long as the image resembled the original enough to be recognized by the family and friends, it was considered sufficient, and the artist's work lauded. Since those days, how things have changed. As the boy said, "Things ain't now as they used to was." In looking over old family pictures, some daguerreotypes made in the forties are clear and brilliant as the day they were made, while photographs made years after, are faded, yellow and so indistinct as to render it impossible to decipher the features. These must have been made during the period when the art progressed backward. The introduction of albumen paper seemed to improve the results but not the permanency, as the old family pictures made on plain paper have changed much less than those on the albumen, and unless the present tendency to hurry out the work and cheapen the price is changed, and everything done to enhance its value by permanency, our children will be looking at the counterfeit presentments of their parents, and wonder how, in an age so progressive and full of advancement in the arts and sciences, any one could have been so blind as to neglect what should be one of the chief aims of the art, viz., permanency. Especially so, when it has been thrust at them again and again in the way of carbon, photo-lithos and Lichtdruck processes. There is no reason why every photograph that leaves the gallery should not be as permanent as any book that is printed, and cause a demand for a paper that shall be so constructed as to be unalterable by the action of light or air. A move in this direction would be the proper one to make, and I do not doubt for a moment but that the public of to-day are fully enough enlightened and educated on the subject. If the two styles of pictures were presented to them, one of usual mode of production and another that was known to be imperishable, even at quite a difference in price, there would not only be no hesitation, but they would grasp at the chance of procuring

them, and this, once started with one of our leading galleries, would soon force others into producing the same pictures. Amateur photography will do its share. Some professionals fear that the great accessions to the ranks of the amateurs will do their business an injury, and interfere sadly with their yearly profits; but such are very short sighted, and either do not remember or wish to forget that many of their improved modes of producing their work were discovered by amateurs and given freely to the world. There are very few amateurs who either profit or try to do so, by any of their discoveries or inventions, *au contraire*, they are careful to disseminate such knowledge as early as possible, being content with the glory supposed to attend such publication. How do the records with professionals stand under similar circumstances? Why some have even gone so far as to refuse to trade with dealers who supplied amateurs with goods. In an enlightened age as this, what results can be expected from such? Shall I change my restaurant because they sell food to a heathen Chinee? I think I ought rather to congratulate John Chinaman on his good taste for preferring Yankee dishes to his bird's nest, rat fillets and shark fins, to say nothing of canine tenderloins. However, the talk of the day is, and papers brought before societies are replete with "The great advancement in our Art." Now please point out some of these advancements or improvements, and let us see who made them. As regards apparatus: the amateur has bought a camera, and after using it a while, found some points that could be improved upon, and in place of securing patents on such, has invited the attention of the manufacturer, fairly trembling at the idea of making a suggestion to such an individual, and often orders a new camera made embodying his improvements. The manufacturer, seeing the value of such, adopts the idea, and it goes out on all subsequent cameras. This same thing is true as regards many different articles used in the art or business. A new process is published, and who is the first one to test it and make public his results? Again I reply, the amateur, and if it proves to be something beneficial to the professional and will add to his income, how quickly he advertises it, and pushes it before the public. Let an amateur go into the gallery of that same professional and make himself known, and what kind of a reception would he meet? Why it would freeze the Styx in less time than one could think. To-day there are some amateurs so cognizant that

there is a great future for orthochromatic work, and that it must eventually play an important part in the art, that time and money are spent lavishly to produce a perfect result. Not satisfied with partial success, as this only shows there is a grander future, their great aim is, to reach the point of perfection. This gained, who will profit by it? Not the ardent workers, as they feel fully repaid by gaining the point desired, but it will be some maker of dry plates who will follow their formulæ, and the plates will be sold everywhere. The true amateur will not rest here, as some other weak spot will be found and he will turn his attention to it, as well as invite his fellows to find a remedy. And thus it has gone on, and will go on forever. It is possible that there will be found among the ranks of amateurs, some who will not part with their knowledge without a compensation, but such need not be feared by any professional, as such a soul cannot discover very much of value. It will be naturally too cramped to digest, let alone impart. The immense and rapid growth of amateur photography in the United States in the last ten years is wonderful, and has greatly increased the output of apparatus and utensils of various kinds, as well as brought into existence houses for the sale of such, that without such growth would never have had existence. As regards the goods that emanate from many such, I will not say here, but it is unfortunate for many that they buy their outfits before they know anything of the uses of same, and in some cases are so disappointed that it is thrown aside, and all confidence destroyed as regards photography being easy to acquire. Years ago, the expression, "Oh, that is good enough for an amateur," might have answered, but that time is past, and it is fast coming to the point when to say to a professional, "Why, that is good enough for an amateur," will be sufficient guarantee that it must be perfect in every respect. The difference is just here: an amateur, i. e., a true amateur, goes through every detail himself, and is not satisfied until he not only knows how to produce a desired result at once, but fully understands the whys and wherefores of failures. These stumbling blocks once known and understood are more readily avoided. The professional, as a rule, hires men who are supposed to know all the points, and all he cares for is the finished result. If his forces can turn out the work satisfactorily, what more can he ask for? As to the details of the developers, etc., etc., intensifiers, reducers, etc., how many are there will

read this article that can begin with exposing the plate, and go entirely through all the manipulations to the burnishing of the mounted print? Of course those can whose business is such as to require no array of assistants (?), but in the larger towns is whereof I speak. Ours is quite a town (not down on the map). I might digress enough here to say something on another point, although I began by digressing from nothing and have been constantly in the same rut. I think the amateurs keep themselves too much aloof from professionals and do not seem willing to join with them to the extent they should. From what I have seen, if the amateurs would get professionals to join them in their circles, and take part in their debates, it would not only show both the false barrier that had been placed between them, but each one could render the other valuable assistance. One, by his theories and explorations in channels for which the other has found no time, and the professional could quote actual experience and give suggestions that would materially assist. Because I deal in boots and shoes, cannot I give the tanner a suggestion whereby he may improve the quality of his leather, for fear my opponent on the corner above may profit by it? I will take my chances. Any profits in our business are *lasting*. To return to one of my channels, where has the carbon picture gone to? Is there any photo in the country who makes these pictures at present? Some years ago they raised quite a furore over this beautiful picture, but I understand it was hampered to considerable extent by patents under which licenses were sold. These patents have mainly expired now, so there can be nothing in the way of any party who wishes to make them, and your publishers should urge their customers to again put this deserving picture where it belongs, in the front rank. If amateurs generally understood them, there would soon be a demand created by the public, and a push by one house would, as I said before, be followed by others. An albumen print cannot be compared with a gelatine print from the same negative for delicacy, detail and preservation of the high lights. As this was true in the old days of collodion process, why should they not prove still more beautiful from gelatine negatives as are prevalent now? I very much fear that the more I look over the art as practiced to-day, that the retrograde movement more than counterbalances the improvements, notwithstanding the apparatus and lenses are far superior to what could be bought when I began, there are some

articles, notably albumen paper, that has been in use for thirty years (I am told), and remains to-day very much the same as in the beginning. When I started this article I spoke of the beginning, and find I am back again to the starting point. I must have circled around and must begin again, another year.

DARK ROOMS AND DEVELOPERS.

By Prof. Peter T. Austen, Ph. D., F. C. S.

This Fall I wished to have a small dark room in one of my work-rooms in which to change plates and develop lantern-slides, etc., and not wanting to spend any more than was necessary upon it, I cast about to find some cheap way to make one. The result was an excellent room and a very cheap one.

A light framework is built, preferably in a corner, where it can be braced against two walls, and a door frame set in one side. The door, which need also only be a light frame with two diagonal crossbars, is hinged on. The whole structure is then covered with sheathing paper, such as may be obtained at any hardware store. It is a good plan to get credited with a whole roll, and return what is not used. If the room is wider than the paper, uprights should be put where needed, so that the paper may be tacked on at its joints. The paper is tacked to the bottom of the framework and carried up, over and down to the floor on the other side. It is tacked on the uprights and crosspieces. The edges should lap a good inch over each other. When all is tacked down, thin lathing should be tacked on over the paper joints to hold it flat and make it perfectly light-tight. The door is covered with paper in the same way. On the inside, around the frame of the doorway, strips of the paper six inches wide are tacked, so that the door shuts against them, and any light which may get in around the door is thus "killed." On the outside edge of the door (top and side) another strip of paper is tacked. This arrangement makes a light-tight door. Should any lightholes be found in the room, they may be easily stopped by pasting patches of the sheathing paper over them on the outside or inside. A window or two is cut in the paper and a couple (or more if needed) sheets of ruby paper pasted by their edges on the outside or inside. It is a good idea to paste on one sheet of ruby paper by all sides, and then paste on two more

sheets of larger size by the top edge alone, turning the bottom edge over in a loop, and inserting a heavy iron wire. These sheets can be lifted up if required and so more light let in, but it will not often be found necessary. Shelves are easily put up by angle irons screwed to the uprights. The door is secured by a hook and eye, and a flap of paper made to turn on a nail is used as a shield to cover it.

My little room is a delightfully cosy nook to work in. After fixing I do all the rest of the work in the open room. Pieces of sheathing paper cut an inch or two larger than the pans make admirable covers. I often put such a cover on the hypo pan and bring it out into the room.

Should I build another one of these paper rooms, I shall cover it entirely with ruby paper. Indeed, I have cut so many windows in my present room, that it is beautifully light and clear. Some enterprising photographic supply-dealer might easily get up a steel framework which might open, or be put together with a few screws and bolts, and be covered with a heavy ruby paper. Such a device could be made to take apart and go into a small space.

DRIP-PAN.

No matter how careful an operator is, he is liable to spill from a developing or fixing pan, and this soon makes a mess. In a properly built developing room, the work-table is always over a sink, and consists of a lattice work, so that the drip does no harm. But many amateurs work in closets, and not a little developer disappears, to cause quite unexpected developments later on.

The following device will obviate this. With a gimlet and a keyhole saw cut out of the shelf, or work-table, a piece say 8x10, up to 12x16, as the case may be. Nail, then, half-inch strips across it leaving a space of three-quarters of an inch between them. At each end of the hole, screw in underneath a screw-hook. Hang on this an agate-ware pan of the right size. When it gets full of drip, empty it. This will be found to be a great improvement over the solid shelf. Instead of agate-ware, the economical operator may get an iron stew pan, and give it a couple of coats of black varnish and a good sunning. When the varnish begins to scale off, paint it again.

THE KNACK OF DEVELOPING.

Experienced operators do not follow very closely any fixed rules

or formulas, for the trained eye and finger are worth any amount of rules. This is particularly the case in developing, for an old hand will get results which a novice who follows him as closely as he can, is unable to obtain. I have for some time made a practice of suiting the developer to the picture in a more elastic way than strict formulas allow, and it seems to me that such a practice is worth more general attention by those who are able to get a little beyond the rigid proportion of formulas, than it receives. An instantaneous picture, for instance, is usually best started with a weak or old developer, but sometimes even then it is liable to "jump," and a hasty application of restrainer, or removal from the developer, is not always followed by the best results.

Old developers are simply weak developers, or amount to such in action. Pyrogallic acid has no practical effect as a developer unless converted into its alkali salt. Hence we have an excellent opportunity to control the developer with great accuracy. In spite of all precautions, records, etc., exposures differ very much at times from what one should expect. The difference in the quality of the plates, in the actinic power of the sun, in the position of the camera to the source of light, in the temperature and strength of solutions all combine to make the development of plates, especially of plates exposed some time ago, an uncertain matter.

The way I am in the habit of doing is about as follows: 5 grams of crystallized bisulphite are dissolved in water and placed in a pan. The bisulphite is kept as a 20% solution, *i. e.*, 200 grams of the salt are dissolved in water and made up to 1,000 c. c. I mention this strength, because so much quibbling has recently been published about percentage solutions by those who are not familiar with chemical work, that a considerable amount of dubiousness seems to exist in the minds of many as to the differ ent kinds of volumetric standards. Every 5 c. c. of this solution will contain 1 gram of the salt. I place in a beaker, or tumbler, 25 c. c. of the bisulphite solution and add 75 c. c. of water, thus making 100 c. c. of liquid, in which are 5 grams of bisulphite. To this is added two even full mustard-spoonfuls of dry pyro. The mustard-spoon is the common wooden spoon which is sold in the shops. It is filled by thrusting the spoon into the pyro and drawing it up against the side so that the contents are leveled. If this is done without packing, the contents of the

spoon will be found to weigh about half a gram. It is not necessary, however, that the weight should be exact.

The alkali, which may be carbonate of soda, potassa, or caustic ammonia, whichever may be the pet of the operator, is kept in a large bottle. The strength is best a twenty per cent. solution of the carbonates, but it need not be accurately mixed. When ready to develop, I pour into a four-ounce salt mouth bottle enough to fill it about half full, from which I take what I need. Larger plates will, of course, require more developer than 100 c. c., but I have used this amount as a convenient basis. A greater amount of solution is made by simply increasing all the amounts.

The plate is washed under a rose, or in a pan, with water, rubbing it smooth with the fingers, thus getting rid of any dust which may have gotten on it in spite of all precautions, and giving the film enough water to prevent the developer from "jumping" too rapidly by absorption.

With small plates I use a convenient little tool, an "eye dropper." It is a pointed glass tube with a rubber bulb on the end of it. Everyone is familiar with them, as they are so largely used in filling stylographic pens. The dropper is filled with alkali solution from the wide-mouthed bottle, a few drops run into the developer, and the whole well mixed by stirring with a glass rod. The dropper may be graduated with file marks if desired, so that a given amount may be easily delivered. This, however, is not at all necessary. For large plates I use a graduated Mohr pipette, provided with a rubber bulb. The plate is then placed in the tray and the developer poured in. I watch now to see what takes place. Sometimes the image does not appear, then I pour the developer back into the beaker and add more alkali, as experience indicates, and again pour back on the plate and observe. I soon get the picture started, and by so handling it, make it grow as I wish. Sometimes a very little alkali suffices; sometimes a good deal is required. Sometimes I find it advisable to put in a spoonful or two more of pyro during the development. I find that in this way I have a perfect control over the development and avoid fogging or having the image "jump." As a rule, good negatives are obtained in cases where a rigid adherence to a fixed formula might interfere with obtaining the best results, even when the developer is diluted and restrained.

With time-exposures a formula can be used without difficulty,

although even with them I find that a good deal of "tickling" is possible if one is dexterous. But with instantaneous views, taken in all sorts of lights and angles to the light, and on all sorts of plates, quick, slow, old and fresh, no rule holds good in all cases. By careful treatment, such as I have indicated, many a so-called underexposure can be brought up to a fair silver-printing negative and a good slide-printer. It is often a good plan, when the development is almost done, to squirt in a double dose of alkali, and bring out detail; but if this is done great care must be taken to get the plate out before it fogs. It is a risky tactic, but can be done by a skillful operator. If, on the other hand, density is what is needed, a spoonful or two more of pyro may be added.

Should the amateur feel timid about departing from his standard formula, then let him add his pyro solution first. Next pour into a graduate the amount of alkali solution called for and add it little by little in the manner I have described. He will get a better control and better results than by a continual adherence to his formula.

PERMANENT IRON DEVELOPER FOR BROMIDES.

The old oxalate developer has many good points, but it has the very unfortunate property of not keeping. The solution of sulphate of iron rapidly absorbs oxygen from the air and becomes turbid from the precipitation of a basic sulphate of iron. All sorts of cures for this have been devised, such as layers of oil, etc., but they all lack the element of simplicity, and without this element no process can ever hold its own. I cannot find any record of the use of Mohr's salt instead of sulphate of iron in this connection, although its use must have suggested itself to some one. In wet plate work the double sulphate of iron and ammonia was often used and called "double iron," while the sulphate of iron alone was called "single iron."

The following modification of the oxalate developer may be found to be useful: In making the saturated solution of sulphate of iron, about one-half of its weight of sulphate of ammonia is added at the same time. The solution is then filtered, or decanted, as usual. The solution now contains the double sulphate of ammonia and iron, which, while it acts like the sulphate of iron alone, is permanent and does not precipitate on standing any ordinary length of time. The saturated solution

of oxalate of potash may be added to the solution of the double sulphate in the same proportions as to the solution of the sulphate of iron alone. The resulting mixture, however, is permanent. I have used a mixture of this kind right along and find it works satisfactorily. This modification of the iron and oxalate developer is a permanent one solution developer. It acts about the same as the old iron and oxalate mixture. On standing exposed to the air the "double iron" slowly takes up oxygen from the air, assuming a deep-red color, but not precipitating.

A SHOT-GUN CLEARER.

After washing the hypo off to some extent under a rose, I put the plates for a few minutes in a solution made as follows:

50	grams of	Alum
10	"	Chrome Alum
50	"	Sulphate of Iron
20	"	Sulphate of Ammonia

Dissolve in 900 cc of water, add 10 cc of concentrated sulphuric acid and dilute to 1,000 cc.

This hardens the films, clears up generally, while the sulphate of iron brings out the detail a little. The solution will also strip if the plate is left in some time. In this way it is useful in making lantern slides, which may be over-exposed and then stripped down, thus getting the clear high lights of the wet plate.

The plates also dry more quickly when treated with this mixture.

Should the mixture be found to be too strong, as it may when very "thin" plates are used, it should be diluted with water.

TAKING PLATES OUT OF THE BOX.

I have adopted for some time a plan which, while apparently hardly worth mention, and perhaps even not original, is certainly very convenient. The top box is taken off, and with a knife the narrow side of the inside box is slit down at both corners, so that this narrow side drops as a flap. The plate is then slid out a little until its end projects, when it may be easily lifted out. When all the plates required have been taken out the flap is shut up and the covering box put on. This suggestion is intended to save much useless profanity.

A CONCLUDING CLUCK.

Some years ago, about the time when bromides came out, I read an article by an enthusiatsic amateur, in which the author

stated that he was so delighted with them that he had discarded silver-printing entirely. More lately I have read similar sentiments expressed by others in favor of the aristotype, the platinotype, hydroquinone, and other novelties. Enthusiasm is always a good thing. It is to a man what steam is to the engine. The more of it the better. But why make one's dinner of soup alone, or why should pork and beans be one's only article of diet? To get the highest degree of pleasure one needs variety and novelty. When the amateur gets his hand in, let him try everything. Is the negative of a black and white snowscape, try it on a bromide. Is the contrast great, try with a rough paper bromide. Does it give a chance for mellow tone, try a platinotype. Is there an opportunity for great depth, try an aristotype. Can you get a general all around good effect, try a silver-print. Is the prevailing tint of the landscape brown, tone brown, would the brown landscape be improved by contrast, tone it purple or black. Is the bromide too hard, tone it off with uranium. Every negative is a problem in art. Is the landscape too sharp, focus it a little out and dim the outlines. Try every kind of plate and paper that comes out, every developer that appears, every suggestion that is made. In this way photography becomes not a mere practice of taking photographs (I purposely avoid using the word "picture"—few photographs are pictures), but an educational study of art, a valuable practice in the science of chemistry and optics, a strong impetus to original investigation and discovery, and in every way an occupation and a study, the didactic value of which cannot be overestimated.

We have the education in words, of which (worse luck) most of our school-education consists; we have the study of things, which (thank Heaven) is now getting attention, and the seven hand-tools are demanding some of the time formerly paid to the pen and the printed word alone. We have now the science and practice of photography, which aside from its practical worth, is a most valuable educational subject. In its processes are involved the application of chemical principles, in its lenses the principles of optics, in the formation of the latent image, the principles of spectroscopy, while the practice of the art is a most admirable manual training—a training of the eye and of the hand. Aside from these valuable educational branches of work, it offers other and equally valuable educational attractions. The eye is

educated in the measurement of distance, in the kind and power of the light, in the relation of light to shade, in the depth and position of shadow, and in the intensity of high light. The eye is educated to observe the relations of objects to each other, the nature of perspective, the forms of clouds, the sparkle on the water, and the nature of various colors. With a camera in the hand, the boy or girl tramps about in the open air, climbs mountains to catch a peep at the quiet landscape nestling in its umbrageous frame, or the silent scene dreaming in the translucent embrace of the glassy lake. Up hill, down dale, through fragrant copse, over spicy fields and heather and tinkling rill studying the foliage, the sweep of branches, the wild-flowers, the browsing cattle, the springing squirrel, and every beauty of nature below and above wanders the "camerad" with senses alert, inhaling fresh air, developing strong muscles and red cheeks at every step. Surely such an educational process demands most earnest attention from thoughtful men. Moreover, all of this fertilizes and nourishes the sense of art, the flower of the human mind, the love of the beautiful, the God-like. The habit of observation grows up in one. The landscape becomes a picture, and objects arrange themselves in artistic relations. The scene is imprisoned on the plate to be preserved. Years after, one looks at the picture and the whole scene comes back; each object is seen and each sound is heard. Faces are studied, features and expressions are observed, attitudes and movements become objects of interest. In every way the faculty of observation and the true sense of art are trained and developed.

It seems to me, then, that the science and practice of photography possess great educational worth, and I think this fact should be recognized by educators. I think that a camera and outfit should form a necessary part of the teaching apparatus of every school. Whatever causes or inclines one to the more intimate study of nature, or the things about one, cannot be too highly estimated in the present day.

THE PLATINOTYPE BY COLD DEVELOPMENT.

By D. Bachrach, Jr., Baltimore.

This process seems to me, from the limited experience I have had at present, to give greater promise of being *the* looked-for

method (combining permanence, matt surface and beauty of result with ease of working and modification of effect) than anything that has as yet come forward. Mr. Willis, the indomitable and indefatigable inventor of platinum printing, is to be congratulated upon having arrived so near the goal for which he has been working for nearly twenty years, and to which he has sacrificed health, leisure and many of the enjoyments of life. A brief description, perhaps not accurate in every detail, may serve to illustrate the method, and enable any one to experiment with it who can obtain one of the chemicals so essentially necessary, viz., the *pure* biphosphate of potassium.

It must be explained here that the patentees, the Platinotype Co., have not yet introduced the process in this country, and the chemicals are not yet on sale. From the description in the letters-patent I copy the following formula: "To the usual solution of ferric oxalate, as prepared by the company and sold to licensees, add two grains of bichloride of mercury to each ounce." This is the sensitizing material, and it is spread upon the printing surface in the same way as any sensitizing compound, and then allowed to dry spontaneously. This will keep a long time in a calcium tube.

It is slightly more sensitive than the old method of platinum printing, and very little experience wil, enable a printer to judge of the desired depth. Before developing the prints, they are to be allowed to absorb some moisture by hanging or laying them in a damp box or closet.

The normal developer is composed of 40 grs. of oxalate of potass, 100 grs. biphosphate of potass dissolved in one oz. of water.

For a lot of small prints, say up to ten inches in size, sufficient solution should be made up to cover the bottom of a porcelain tray. Just before using it, ten grains of the chloroplatinate of potassium, (called platinous chloride) as sold by the Platinotype Co., is to be added to each oz. of the developer.

The prints are floated on this a tew moments, and then laid on a clean flat surface to complete the development which commences at once, and is finished in a minute or even less. Now here is where this process has such an immense advantage over the original method of development with the hot oxalate solution. The developer may be weakened with water before adding the platinum salt, thus increasing the proportion of the

latter to the developing salt, for weak negatives. This insures slower development and greater brilliancy, and, in fact, up to a certain limit the result is under control, which was not the case with the old method. A poor negative with the latter meant a poor print invariably. But now, or as soon as the company can supply us with the chemicals, we can do as much with it in doctoring a weak negative as we can with the silver printing, with the great advantage of beautiful results and absolute permanence.

I had almost forgotten to mention that at first glance it would appear to be very expensive for large prints, as a solution large enough to float a print say 20x24 inches would cost enormously in platinum, unless a large number were to be developed at once. But I found this fear unfounded, as by trying a few prints, by *brushing on* the developer, the same as the sensitizing solution, the results were perfect and free from the marks that I expected, by simply making the operation continuous, without halts. The fixing of these prints is the same as in the old process, by soaking in a weak solution of hydrochloric acid and a short washing in water.

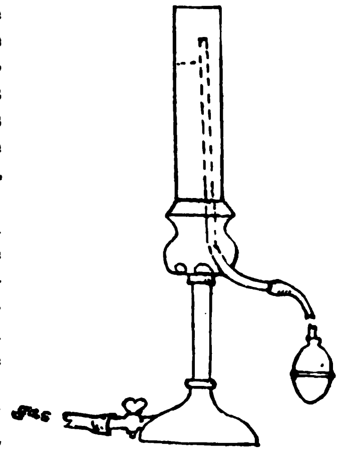
I do not believe, however, that, for cabinet sizes and smaller pictures, any process will, for a long time, supersede the albumen prints, with their rich tones, great depth, transparency of shadows, and rendering of detail in the same; but when it comes to large work, where glass is an absolute detriment, and purplish or brown tones are not the prevailing rule, I believe this process is now perfect enough to satisfy the most exacting taste. I see in it the germ of a great future, as with permanence assured and artistic merit undoubted, it can be confidently put forward by photographers as the most perfect product of monochrome graphic art, and it will be preferred, at a higher price, to the cheap and meretricious crayons of which the public has had a thorough surfeit.

TWO BITS.

By Robt. E. M. Bain.

Photographic popular attention being directed, at present, to exposures by magnesium light, a description of a home made magesium lamp may be not be out of place. Having on hand

an extra gas stove burner, of the usual Bunsen type, I had a tinsmith introduce, through one of the air holes, a five-sixteenth inch brass tube, extending into the burner within three-fourths of an inch of the top. Below the tube was bent at a right angle and a rubber tube and a bulb attached. For use the burner is attached to a drop light, or gas jet, six or eight grains of pure magnesium poured through a funnel into the small tube inside, and the gas turned on and lighted. The heat is very intense and the magnesium almost entirely consumed. I have a number of very good interiors, and portraits taken with from five to eight grains of magnesium. The whole costs about twenty cents and, where gas is used, it is more convenient and economomical than any of the alcohol lamps.



A local amateur, who experiments considerably with new methods of printing, has lately submitted some extremely pretty effects in the line of blue prints, so called. Instead of using paper he purchased some linen D'Oylies and napkins, and while stiff coated them with the usual ferro-prussiate solution. When dry they were placed in a printing frame, and a different subject printed on each, in vignette. Washed and ironed, they became photographs in blue on linen and the effect was extremely attractive. Try it.

THE USE OF DETECTIVE CAMERAS.

By Graham Balfour, M. A.

Detective cameras will, no doubt, be largely used this season. I can think of no form which they have not assumed except that of an umbrella, which when open might serve as a dark room. This idea I present to the patentees. But surely most of these devices are futile. I use one of the ordinary black leather

despatch box cameras, and have invariably been at once "detected" myself by the most ignorant and least suspicious people. The real advantage is that we have a portable camera which requires no stand and no focussing by eye, but one in which the plate is ready for exposure at any instant.

I cannot say that the results which I have hitherto seen, have been encouraging to enlargements. In fact, the lens can rarely be stopped down enough to give sufficient detail for this purpose. Work in small sizes, on the other hand, is apt to encourage the shiniest of papers and most evil colors. The most attractive and most suitable subjects for this camera are momentary and unpremeditated gestures and groupings of men and of animals. Even if a long exposure should be possible, it is not always feasible to secure the absolute fixedness of the camera itself. To get an image big enough to be effective without enlarging, is the chief difficulty. This requires a long extension and thus increases the bulk of the camera and the nicety and frequency of focussing. Before I could be content with only a detective camera to take abroad, I should certainly require a swing back, which I have not yet seen in any make.

Whether this handwork will do anything to improve the art of the matter, the thing most needed by photography, is very doubtful. For hints and details these will be invaluable to painters, but I do not know of any figures which could be usefully printed into a larger landscape. To photographers this camera will serve at best as a note-book for ideas to be worked out afresh on a larger scale or items to be included in other pictures.

But for the average person who often survives even in great artists, there can be no more delightful mode of recording the salient features of a holiday or the typical incidents of everyday life.

The right to photograph unconsenting strangers is a very difficult question. In English law the ownership of the negative, or at any rate, the right of printing from it cannot be said to be yet finally decided. The latest judgment on the point was based mainly on an analogy between a photograph and private letters, which the recipient owns, but may not publish without the permission of the sender who has no longer any property in them. Thus the photographer owns the negative, but may not print from it for his own use without license from the sitter who is only entitled to the prints paid for by him or her.

If this view be not yet confirmed when there is a contract between the photographer and the photographee, what can be said where the person taken is either ignorant or reluctant? The natural right to one's own effigy, even when no great improvements have been effected by the tenant, seems as good as the natural right to freedom, but is perhaps equally hard to secure. We first fall back on the old saw that "a cat may look at a king," but then when we remember that the instantaneous wink of a camera means a resulting image which will last for centuries, a lesson of our childhood recurs to us that "it is very rude to stare." It is true that a passing glimpse may create an impression which endures for a lifetime, but then that is always repeated or prolonged if possible. But if to take the photograph of a person which may be before our eyes for the rest of our life be not staring, it is too close akin to it to be courteous.

The only distinction I can draw is between photographs published or exhibited, and those kept in private hands and shown solely to friends. If money be made out of the former, there might be a legal remedy; if the sitter were unwilling, the act would certainly be a moral outrage. At best, some hideous image of a celebrity dead and gone might be produced in after years, and would then rank beside Wm. Froude's picture of Carlyle, like but unloving. If the individual photographed had no objection at the time, and if care be taken to prevent the prints coming into wrong hands, this, after all, falls short of reading interviews and society journals. And who, among us, is innocent of all these things?

A PRIVATE STUDIO.

By Miss Catharine Weed Barnes.

It may seem audacious in one who has had a studio less than a year to write about it, but audacity can be pardoned where it proves helpful and my efforts to build a portrait-studio may suggest some ideas to those amateurs who think a home-made studio impossible. Mine, costing between four and five hundred dollars, would not have been so expensive but that peculiar circumstances necessitated certain work which had to be done carefully, if at all. This sum does not include my lenses or camera.

After some little experience with interiors, I took up portraits,

beginning, as usual, with a sidelight in my own room and using reflecting screens. But the sittings had to be so long that few people could or would keep still long enough and they would refuse to use a head rest. It was almost impossible to properly regulate the light, and the shadows, though carefully managed, were decidedly too intense for beauty.

So I decided to build a studio, although much planning as to the "where" and more still as to the "how" became necessary, besides much reading on the subject and interviewing of professional friends. Few private houses have rooms, even under the roof, which can be so utilized, and few people are willing to disfigure the outward seeming of their houses with a regular skylight. But the household powers in my case being propitious I was allowed to carry out my plans.

To begin with: The house has nearly a flat Mansard roof which had a small square cupola giving light to a low, but large attic. There were several chimneys to avoid and the scuttle opening to the roof could not be altered. This attic was an *omnium gatherum* of what usually collects in such places in addition to a formidable number of trunks and bags to be often removed and put back; ours being a traveling family.

This prevented a continuous platform being built, as a passage way had to be left for the trunks. The roof of the attic was too low, except under the cupola, for portrait work and the latter had light only on the sides. Distance was gained at the price of knocking one's head against the roof timbers, but, after much revolving of the problem, it was decided to remove the cupola, cut the roof timbers and support the roof where needed by strong, upright, iron bars. The open space thus gained was nearly nine feet in width by nineteen feet in depth, with three feet more where the roof sloped a little. The floor was too far below the light and so a permanent platform was built for sitters at the eastern end of the room, nearly two feet high and nine square with a step at one corner. This brought the side light about six feet above the sitter.

At the back of the platform were placed three mounted backgrounds eight feet square, two of them painted in soft shades by Mr. Seavey, while on the third could be drawn in pastel any desired design which could be rubbed off and replaced by others.

As I was not allowed to partition off the studio from the rest of the attic, the same object was gained by heavy curtains, dark

on the south side and light gray on the north side of the room. Then a movable platform about a foot high was made large enough to hold an eight by ten portrait camera and stand and leave room for the operator. It runs on heavy castors and, with a Voigtländer Euryscope, has to be pushed back nearly the whole length of the studio for an ordinary size head or figure. With my 3 B, Dallmeyer lens I run it close up to the main platform for large heads and but a short distance back for small ones or standing figures. This lens works with great rapidity so that I cannot use it even with a shutter, taking the full opening, but am obliged to use the medium stop and a trifle less than two seconds' exposure on a dull day. My shutter is much less complicated than the Prosch, works just as well for my purpose, and costs less than half as much.

The light comes from the north side of the studio and the whole skylight is of glass except the framework and a few inches of curbing to protect from leakage. This excess of light, made necessary because the outward appearance of the house could not be materially changed, has been overcome by grey shades on the east, south and west sides of the room while those on the north are white, each of the latter being in two parts, sliding from top or bottom as desired. There are seven upright sidelights, 26x30 inches each of plain glass, and the same number of toplights, slanting at an angle of 45°. These are of fluted glass 30x60 and slightly project over the side sashes. The room, where the partition curtains are closely drawn and the gas stove is in operation, is very comfortable even in Midwinter. It is thoroughly ventilated on two opposite sides. A head rest, vignetter and other accessories help furnish the room and the camera is so arranged that the holder, with plate inserted, can be placed in it before focussing. The ground glass is then slid to one side, the holder taking its place and the slide is drawn without the operator changing position. The slide is not taken out, but pulled over from the front and slipped back by a short strap, somewhat as one opens and shuts an office desk. After exposure and removing the holder the ground glass can be run back for another sitting. One very valuable quality in my Dallmeyer portrait lens is that it admits ef diffusion of focus and this opens up almost unlimited possibilities in the wide and varied field of portraiture. A number of plates were spoiled in learning this, but now I feel like framing

two prints and labeling them "Before" and "After." One has more than half the figure out of focus while the other is clear and sharp throughout. I mention this because I so often hear it said that this or that one takes such good pictures *because* the instrument is such a "splendid" one. My light being so easily managed I have almost entirely given up the use of side screens except for elderly people or those with strongly marked features.

When it comes to development I use pyro and soda, a strong solution, checking development if necessary, by placing the plate under the tap for a few seconds. My clearing solution is the same as that used for my lantern slides.

There is a large negative closet off the studio and a short flight of stairs leads down to my dark room, a transformed bath room with various formula pasted on the wall, a large tank with running water and a quantity of closet room. But after all was arranged one thing could not be supplied to order and that was *experience.* However, as time and trouble would give that, I took courage as being willing to give "time, thought and brooding care" to my work. Those who are not had better attempt portraiture only under the open sky, abandoning the soft blendings of light and shade gained under the skylight for the crude and harsh contrasts of outdoor work. Of course, if the resemblance is marked and the pose good and there is plenty of detail in the surroundings to call off attention from the portrait the average observer is not apt to be critical. I have heard outdoor portraits called "atistic" when most of the picture was out of focus and the position alone deserved the compliment. Such criticism is discouraging to those who are trying, not to suit everybody, but to do really good work.

Veteran photographers tell us that a great deal of human nature can be learned under the skylight and, in my limited experience, I am inclined to agree with them. People seem to lose their individuality and try to be something else, assume unnatural positions and expressions no one ever saw them have before, their nerves grow tense and the whole frame rigid. I generally say to a sitter: "Just sit as you choose for the present until I arrange the light," meanwhile watching very carefully for any peculiarities of expression or position. When the sitter has quieted down I suggest any needed change of position, adjust the headrest so as to really rest the head, then quietly slip the holder into place, draw the slide and saying, "Just keep still a second," squeeze

the bulb in my hand while the sitter is waiting for me to cap and uncap the lens. In this way I have caught some pictures of people who would be nervous if they saw me go through the latter performance.

Photography is many sided, but portraiture is perhaps its most fascinating one, with the exception of thoroughly fine interiors, so seldom really good. No one who can give the requisite time and trouble to either will regret doing so, though there must be added to these a keen artistic eye and sense of order. The result will more than repay the faithful worker and I urge all amateurs who have not yet tried portraiture to try it for a year and they will be very slow in giving it up for any other branch of this most engrossing of the arts.

ON DEVELOPMENT.

By Wm. Mortimer Baylis.

The following remarks are intended for beginners in the photographic art; they contain nothing that is new, nothing that has not been said many times before, but nevertheless those who are in the early stages of photography will not, as a rule, turn to old publications for information on the art of development, but will more likely be found, asking their friends one after another which is the best formula to use. They try all formulas and all kinds of plates and, more often than not, are satisfied with none. Now, why is this?

Because development is not a matter of so many grains, drams or ounces, but needs the exercise of thought and discretion; hence it is hardly superfluous to repeat again and again how the developer should be used.

In the first place, I would advise a beginner to stick to one make of plate and to use the formula for development given with them; it is probably as good a one for those plates as is needed.

Some advise mixing 10 per cent. solutions, and then making up your developer by taking so many drops of each out of perhaps half a dozen bottles, but the beginner should make only *two* stock solutions, pyro etc., in one, bromide and ammonia in the other, otherwise when developing he will be sure in the dark to get into a muddle. He should not make up a quantity; a couple

of ounces of each is ample, unless large plates are used; and, he will find it more convenient to make these stock solutions of such strength that, on an average, a dram of each will require to be mixed with an ounce of water. This I find the easiest proportion and one which can readily be remembered; it does not require much knowledge of arithmetic to rearrange the formula, preserving of course the relative proportions of the ingredients.

Now, as the amateur usually exposes under all kinds of varying circumstances, viz., as to light, subject, distance from lens, etc., he can hardly hope, especially in his early days, to expose correctly; let him remember a slight error on the side of over exposure will not matter, provided he develops properly, but under exposure must be avoided.

When about to develop, bear these rules in mind:

1st. Never to add more than *half* the quantity of ammonia till all the details are out, adding the rest little by little as required.

2d. That a developer weak in pyro makes a flatter negative than a strong developer.

3d. That quick development gives less contrast than does slow.

4th. Over exposure causes flatness, whereas under exposure causes contrast.

Now, when exposing, make a note whether the subject has deep shadows and bright lights, that is, great contrasts; or whether on the other hand, it is wanting in contrast; as a distant landscape, etc., *and develop accordingly;* for instance, in strong constrasts, give full exposure and dilute your developer by putting two-thirds or even one-half the quantity of pyro to the water, diminishing the ammonia in like ratio; if the contrast is still greater, then only reduce the pyro and your development will be much accelerated, rendering the negative flatter; on the contrary, if your picture is wanting in contrast, do not over expose, and increase the quantity of pyro, and if necessary, diminish the ammonia, remembering that slow development with plenty of pyro will help to give the contrast in which your picture is deficient.

It is of course understood that development is retarded or hastened by reducing or increasing the amount of ammonia.

Slow development is the safest and is generally the best; do not begrudge the time spent, for one good negative is better than a dozen poor ones.

SOME CONVENIENCES.

By Joseph P. Beach.

When the photographic fever first attacked me, almost all the development was done with neutral oxalate of potash and proto sulphate of iron. This was followed by pyro and various compounds of ammonia accompanied by all the poisons of oxalic acid, cyanide of potassium, etc.

In my youth I had a limited instruction in chemistry, and had early learned the importance of being careful when handling ingredients likely to injure the manipulator, who should carelessly put them together, or neglected to keep poisonous compounds out of any sore places he may have had on hands or face. As a matter of precaution, and to avoid the handling of the various mixtures, also for the sake of cleanliness and to make it agreeable work for my daughter—who became my assistant—I invented a number of "*conveniences*," which other amateurs will appreciate if they happen to be situated just as I am—in a country town, where water has to be pumped from a cistern, or drawn from a deep well; where it is expensive to erect tanks and have pipes delivering water wherever "it will do the most good;" and in such quantity as photographers know to be necessary for the proper washing of negatives and prints.

The first of these "conveniences" to occur to me related to cleanliness in the dark room while developing. I put a glass bottom into my rubber developing tray by cutting a sufficient aperture and fastening the glass in the same by means of rubber cement and strips of rubber cloth, cemented on, outside and in. Then I cemented some more rubber over one side of the tray. After that all I had to do, when I wanted to examine the plate, was to turn up one side of the tray. The liquid developer passed to the other side, which received it like a pocket, and then the plate could be observed without soiling the hands, or touching the negative. A few years later this form of tray was introduced by one of the dealers in photo supplies, in the shape of a black walnut construction, having a sheet of glass for the bottom, and a strip of glass let into the wood at one end of the top. The operator was instructed to manipulate this tray in the same way my tray was used.

The next "convenience" that I found useful related to that necessary nuisance, the hypo bath. At the time I mention, the

hypo bath was a shallow oblong or square dish into which the plates were laid flat; and out of which it was very frequently necessary to fish the negatives by groping for them with the fingers; thus frequently getting two or three negatives piled up in a corner, from whence some would be taken with scratched films, etc. This provoked me into devising a way to avoid all the annoyances attendant upon the use of the hypo bath in this form.

With three pieces of wood and some glass, I made an upright box with glass sides. After the wood had been grooved and all parts fitted together, I boiled the wood in some paraffine until it would absorb no more. Then fastening the strips of wood together I filled the grooves with a fluid mixture of pitch and rosin, slid in the two pieces of glass, using more (but dry) powdered rosin to work in all places where tight joints were needed. (I did not then know that suitable glass tanks could be bought. *Baths* they are called, but very expensive however.)

I set up my tanks. One marked HYPO, another labelled ALUM. They were wide enough to hold half a dozen or more plates—lowered in edgewise—and had the further advantage that one could always see, without removing the negative, when the hypo had acted completely.

To this was added another "convenience," in the shape of thin wooden holders with V shaped grooves cut in the two sides, and connected with other thin pieces, like a frame. After taking a fully developed negative from the tray, it is slid into one of these holders, and thereafter I do not touch the plate in any of the subsequent operations of washing, putting in or taking out of hypo bath, or drying. When the washing is complete, by hanging up the plate in its holders, it dries even more rapidly than upon a rack. I made several dozen of these wooden holders, and would not be without them, for they are more handy than a pocket in a shirt. They save not only the breakage of plates, but time and labor, to say nothing about the cleanliness. The facility of lifting the negative in and out of the hypo bath is worth many times their cost. It has always been a mystery to me why a number of my amateur photographic friends still persist in using flat trays in which to *lay* their developed negatives horizontally, for fixing, when it takes much less table room and less hypo to fix plates that are bathed vertically in a tank like the one described.

For washing purposes I made some leaden tanks, so that when the negatives are put in vertically, all I have to do is to pump water upon them half a dozen times, giving them as many changes as may be necessary. In the city, where running water is to be had, such tanks might not be needed, yet even there they would be of great "convenience" to the amateur.

Last winter I went "way down South in Dixie," where those amateurs who have been there know, that few "conveniences" are to be had for the use of the "photo fiend." When I came to develop some plates I missed the facilities used at home. I wanted to oblige my friends at the South by developing a few pictures for them, without asking them to fit up a dark room for me to work in. So I got two pieces of yellow glass, clapped them together, and had them sewed into an opening in a curtain made of two thicknesses of red muslin. This was hung over the bathroom window, and there I developed the plates. The hypo and the washing bothered me. Next day I interviewed the tinsmith and bought some strips of zinc. The man said he could make everything that was wanted, but I soon found he could not make what was wanted under three weeks or a month!! Fact. For a consideration I got him to let me use his tools; I took some strips of zinc, about an inch wide, passed them under the run of a pair of cog wheels. Now I had some corrugated strips. They were cut into suitable lengths of, say, six corrugations. Then I took some wider strips of zinc, turned up the ends into a square shape like a capital U, and soldered on the corrugations, one on each of the upright ends, and one on the bottom. Behold, I had grooves in which to slide plates. To the zincs were attached wooden handles. When these contrivances were filled with developed plates all I had to do to "conveniently" wash, was to drop them vertically into a bucket of water, and repeat the operation as often as was necessary.

The whole dark room outfit and "conveniences" cost about a dollar and a half. I left the things behind me, except the curtain. I carried that along and found it very "convenient" at hotels and in "Boudoir" cars, for changing plates, etc.

Since my return from that trip (which included the crossing and photographing of the "ice bridge" at Niagara Falls), I have developed some more "conveniences" for use at home and abroad. Among the best of these is a hypo bath, or tank, made of gutta percha. Gutta percha can be bought in sizable sheets, an eighth

of an inch, or more, in thickness. I took a suitable piece for the size required, viz., 5x8 plate. This was folded over an inch thick piece of board, planed both sides. The piece of board was twelve inches long, by eight inches deep. The gutta percha was cut large enough to lap all around the depth of the board, except at the top where the tank is left open. The two ends of the gutta percha were lapped over and made watertight by heating them moderately and pressing firmly together. When cool, pull out the board, and you have a tank for hypo that is very useful to carry with you, provided you don't let it come in contact with any very great heat. I have added to each end of mine a couple of pieces of paraffined wood an inch square, each with six V-shaped grooves, into which I drop my developed plates when the bath is set up and filled with hypo.

Now, Messrs. Editors, I have written more about what appears to me to be "conveniences," than you may find room or approval for. My apology for thus taxing your patience, is in the belief, that every amateur wants to do his dark room work as easily and as expeditiously as possible, and if to do so with neatness and economy they find it "convenient" to use such articles as are herein described, the writer will not regret the time employed in making them known.

CHESHIRE, CT.

ENLARGING PROCESSES.

By F. T. Beeson.

Which is the best process for making an enlargement? If this question were put to half a dozen *experienced* photographers, probably as many different answers would be given.

Undoubtedly the most popular (because the easiest and cheapest) is direct enlarging on bromide paper; but I am not going to discuss that, because I believe it is only from suitable negatives that good results can be obtained, and the process has already been fully discussed.

The very best enlargements I have seen, have been made by making first a *reversed* transparency enlarged to the size required, and from that, printing a carbon negative.

The enlarged transparency is made in the camera or enlarging

room, taking care that the glass side of the negative is presented towards the lens. The transparency may be made by the gelatine or collodion process, but care should be taken that it is as full of detail and gradation as possible; and at the same time, vigorous. This should be printed from on special transparency, or negative tissue, and a much longer exposure given than for an ordinary carbon print. The exposed tissue is coated with plain collodion and developed on collodionized glass, and if necessary intensified with a solution of permanganate of potash.

This process is particularly useful where alterations are to be made, as it is easy for a skillful retoucher to make modifications in the transparency, either on the film or at the back, before the negative is made. The negatives produced by this process are usually very suitable for printing in platinotype or carbon and are quick printers.

There are several modifications of this method of enlarging; for enlargements of large size, a paper transparency would give a texture to the picture which many would admire, and any amount of artistic work could be done on the back of the paper. Another modification is to print a negative from the enlarged transparency on ordinary sensitized paper, or the transparency may be used for making direct prints by the power process.

There is another process which is now out of date, but which I think ought to be capable of giving good results, and has the advantage of making a negative direct. A collodio *bromide* plate, either by the wet or dry process, is exposed and developed by alkaline pyro, until the image has penetrated to the back of the film.

The plate is well washed and the image dissolved out, either by means of nitric acid or a solution of iron alum; the latter being preferable, owing to its having a less destructive action on the film. This leaves a negative image in bromide of silver, which can be developed by ferrous oxalate or pyro, and if necessary, intensified with pyro and silver. Obernetter worked out a similar process with gelatine plates, but I do not remember the details.

Very good enlarged negatives can be made by copying a small transparency, but great care should be taken to get a transparency full of detail and gradation.

BY-WAYS AND ODD CORNERS OF WARWICKSHIRE.

By Adolph W. Beer.

One cannot too often reiterate the advice to the amateur photographer that if he wishes for pictures, in the best sense of the word, unique, delightful and fascinating, nowhere else can he better find them than in the quiet, out of the way, villages of dear old England.

They are not generally to be dropped upon just outside a railway station, or near any of the larger towns; mills and forges are alike fatal to the survival of picturesque scenery; so that our first inquiry on reaching any center is for a conveyance to take ourselves (and our 10x8s) in search of nooks and corners untouched by the great "iron developer."

Some of the Avon villages are full of interest. Here you may see the great four-horse wain, common on the roads in the days of our grandfathers—a wide open space half highway, half common, bordered with pretty rose-covered cottages; the great gates of the manor farm at one end of the village; while opposite, among the trees, the square gray tower of the old church stands whitely against its dark background.

Ring up the curtain! The scene opens at Clifford Chambers, in an extreme corner of Gloucestershire, one of these typical spots. Here the picturesque village is scattered on either side of a broad road; by the churchyard wall, is a quaint old timber house, most probably once the rectory; beyond, is the hall, a solid, weather-tinted, Jacobin building; while the village mill (a miniature maple Durham) spans the stream just past the hall gates.

Everything one can expect in an old-world village is here to be found. By the mill, the Stowe creeps lazily by reedy banks, under the green shade of the trees, and standing on the tiny foot-bridge by the mill-wheel where the stream has widened into a shallow water-dash, we are délighted with as charming a little combination as artist could wish or the rambler in search of the picturesque side of country life, desire; by country life, we do not refer to farmyard studies or field labors, which are of every time and place, much alike, but to the fast disappearing scenes of quaint village grouping, country cottages, or old by-roads.

Through winding lanes to Welford, where we find a quiet secluded hamlet, with a little low-towered church; and on to

Weston, the beau-ideal of a foliage and flower-smothered village, every cottage a bower of roses, jessamine or clematis.

Just below here the river Avon seems to spread into several ready, willow-fringed streams, crossed by some ricketty structures, called Binton bridges, to cross which a toll is levied at an old inn, glorying in the famous sign of the "Four Alls."

We saw only two of these quaint relics of the last century during our pilgrimage, viz., this on the dividing line of Gloucestershire and Warwick, and the far older house at Chippenham, in Wilts.

I strongly advise peripatetic amateurs to look up carefully these old hostelries whenever opportunity presents, and to peep into the courtyards at the back; perchance he may be rewarded with a picturesque "find" when he least expects it.

Just off the Alcester and Stratford road we found an old cluster of cottages that looked like a disused wayside inn, and among the gables and gardens, dropped upon a charmingly quaint nook. See the ancient vine mingling with the gray thatch, and overhanging the tiny lattice panes; the little quadrangle paved with broken, irregular, white flagstones; it is just as we found it; not a pot or a pan or a twig altered; only the laborer out of work stood in the doorway in his own unstudied fashion, but with a grace and dignity more Italian than English.

We did not leave Warwickshire without making a pilgrimage to Charlecote, and a volume might be filled with descriptions of this great Elizabethan demesne, its glades and avenues of magnificent timber, its Sixteenth Century Hall, and gateways, with terraces like poems, and cedars that are an inspiration, not forgetting the unique, oak deer-pailing, eight or ten feet high, that prevents the large herds of fallow deer from straying beyond the confines of the park.

Suffice it to say, that had we only secured one picture of the river terrace steps, lighted by the early afternoon sun, so typical of the many-sided studies and pictures that may be obtained in this beautiful domain, we should have been fully satisfied.

We are endeavoring as much as possible to eschew the oft-trodden paths and tourist-haunted districts; Stratford-on-Avon *may* be interesting—we have visited it twice and don't desire to see it again; on the contrary, where the true elements of artistic grouping, whether in nature, or by the handicraft of man, are

to be found, one never tires of revisiting, either with the camera or pencil, appealing, as they do, for reproduction from some new point of view each recurring visit. Take for instance, two opposite and well known subjects—who, with any sense of beauty, would weary of Bettws-y-Coed or Haddon Hall—and many other picture-laden spots we wot of? But as for Stratford, small marvel that our American cousins come by one train and leave it by the next.

Twenty miles or so, across country (but double the distance by rail) is Broughton Castle, a great, gray, semi-fortified pile, one of the seats of Lord Saye and Sele, nearer Shipston-upon-Stowe, is one of the most delightful mediæval halls in the midland counties, viz., Compton-Wingate, but so secluded and ungetatable, that it is little known except to specialists, but well worthy the careful attention of the appreciative amateur photographer.

For our present purpose, Broughton Castle will suffice. Delightfully situated in a wooded glen, it would seem able to offer but a slight resistance to artillery, even so small and feeble as that of the Sixteenth Century; but defended by an embattled wall and by the still existing magnificent moat, of unusual breadth, it has in its time stood a mild siege; and now its venerable gray walls—broken by many gables, and heavy mullioned windows, decorated with emblazoned heraldic devices, and guarded by a massive gate house, connected with the main building by the embattled wall just referred to, now in picturesque ruin—gives us a perfect picture of one of the latest built fortified mansions of our country.

Just outside the castle gate, as it were, nestling for protection as close as possible, stands the church; simple, but in perfect artistic keeping with its surroundings, very reposeful it seems this Autumn evening, no sound, but the cawing of the rooks, disturbing the silence of the woodland; in some strange way, the whole scene impressed one with the idea of familiarity; we must have seen either in dreams or in some forgotten picture —that foot-worn stile, that massive porch and that modest spire backed up by the near and shading foliage!

The interior gives a picture not often found in these "restoration days." The open chancel is either double or has a chapel of equal size beyond it, both enriched with grand mediæval tombs presenting an interior absolutely unique in

our experience ; stone flags, low massive arches, effigies in stone and marble, irregularly scattered about with no decorative anachronisms to mar the effect. Long we could have lingered around this pleasant spot, but our plates were all impressed, and ere night, we must be far away.

A VISIT TO WARWICK.

By R. A. R. Bennett, B. A. (Oxon.).

In last year's "International Annual," I described a visit to Stratford-on-Avon, and, as that was considered by the editor to be worthy of a place within its pages, perhaps a short account of Warwick will be equally appreciated.

Warwick station is on the Great Western Railway and is reached in a little over two hours from London, no change being necessary. On arriving we cross to the other side and then go down the road in front of the station. The road on the right hand is the nearest way to the town, and, after a few minutes walking, brings us to an old gateway with a chapel on the top of it, which dates from the reign of Henry VI. It is now used as a charity-school. The afternoon light in Summer is wanted for this subject, and it should be taken from Jury street, which leads straight on. Instead of continuing in that direction, turn to the left and then take the first turning on your right. Go on to the bottom of this street (Mill street), and then look back, when, if it is a fine day, you will be simply astounded at the sight that greets your eyes. It is not too much to say that a photograph could be taken at every yard, the whole way up this street, without sacrificing any of the plates on an uninteresting subject. The whole street looks as if it had been artificially constructed by some one, and it gives one quite a shock to see men and women in ordinary nineteenth century costume appear at the doors. One wonders if these cottagers have the remotest conception of the beauty of the street in which they have fixed their abode ; probably a row of red brick houses would be just as much appreciated by them!

On the opposite side of the street is the wall forming the boundary of Warwick Castle grounds, the tower at the end of the street being known as "Cæsar's Tower." If permission to photograph inside the Castle grounds is required, an order can be obtained at the Warwick estate office in Jury street. In the

conservatory is an old Roman vase, probably several thousands of years old. The view from some of the windows overlooking the river is very beautiful, and would make a good subject for a detective camera.

Returning to Jury street, we continue our course in a straight line till we arrive at the end, where is the "Leycester Hospital," which was founded by the favorite of Queen Elizabeth. This is a splendid subject for a photograph, being a group of extremely old houses, with quaint carving in abundance on their beams. Permission must be obtained to photograph inside the quadrangle, but this is readily granted on application at the master's house. It is a magnificent subject for a wide-angle lens, though rather apt to appear distorted. The hospital requires the early morning light to do it justice, the sun being in a bad position in the afternoon.

Warwick Parish Church forms a rather effective photograph. It can best be taken from the street, on the south of Jury street, and this also requires the morning light, if sunny. The church contains the celebrated Beauchamp Chapel and a crypt, in which is an ancient "ducking chair," which has probably been frequently used for "ducking" unfortunate mortals under the impression that they were witches.

The street nearly opposite to this ends in an ancient looking building which some may consider worth a plate, and in Market square, opposite the "Wool-pack Hotel" (where plates can be changed), there is an old half-timbered house which makes a capital subject. There are two more subjects worth mentioning; one is the "Millwright's Arms," half way between the town and the station, and the other is "St. John's House," which is a little further towards the town. This makes a good picture late in the afternoon. In fact, good subjects are continually turning up, as one wanders over the town.

If time permits, a visit can be made to Kenilworth (tram from Jury street to Milverton station, and thence to Kenilworth, by London and North Western Railway), where the object of interest is the *Castle*, which is about half a mile from the station. This can be taken effectively from several points of view. It wants a fine day, for the red sandstone of which it is composed is of a very non-actinic color, and requires lighting up to make a good subject. Amy Robsart's room will naturally claim one plate. The church at Kenilworth is also worth taking, being a

very quaint structure. Stoneleigh Abbey is a well known photographic resort, and is only a short distance from Warwick. "Guy's Cliffe," about three miles off, abounds in splendid subjects, and in fact the whole nelghborhood is worth "lionizing" thoroughly, from a photographic point of view.

THE LOST ARTS.

By Abraham Bogardus.

Wendell Phillips often gave to his audience his lecture on the lost arts, and, although the undersigned humble individual would not for one moment compare his knowledge with the abovenamed celebrated orator, yet, while Mr. Phillips' knowledge was derived from reading the past, mine came from actual experience. I speak of some of the lost arts, with which a former generation was conversant, now laid aside, dead.

The first mentioned is the good old daguerreotype, with its perfection, its beauty, its accuracy, and its prompt execution. It has never been excelled by any production of the camera. Like all of us, it had its faults, in fact, was full of *shines*, but with all its faults "I love thee still," but alas, it is gone beyond resurrection.

'Tis as far beyond recall as the first hour that dawned on Eden.

And then the old buff wheel. That, too, is a lost art. Oh, how we used to ache from head to foot, especially the foot, in making the wheel go around. No brain work about that; just solid labor. It had its uses and its day. The old buffer is done for.

Next the *bromide patent* also lost. If it was not high art, it certainly cost high to get rid of it. It received curses enough to kill any thing. I well remember the trip with one of the committee and two Philadelphia lawyers to Washington, that city of politicians and oratory. It was Midsummer. Negroes and flies seemed to be the principal occupants of the place; the darkies all tired, but the flies very lively, especially in the hotel dining room. We had a hearing before the Commissioner of Patents, with a triumphant result. The bromide patent was dead.

We carved not a line, we raised not a stone,
But left it alone in its agony.

MAKING COLLODION.

That, too, is fast becoming one of the lost arts. The dry plate

fixed it. Old operators will remember the exact weighing and measuring and shaking, and how we used to blow up the gun cotton (by word of mouth), because it would not dissolve, when we well knew the gun cotton possessed greater blowing power than we did, and that is saying a great deal.

And then the *silver bath,* forever wanting to be boiled down or standing in the sun, receiving its strongest baptism of light that it may do its dark work the better. Farewell to spoiled wristbands and spotted carpets. Farewell to black fingers and finger nails the color of tanned leather. The old bath also had its faults, but it made powerful good pictures, seldom equaled and never excelled.

HOLDING YOUR WATCH TO TIME THE SITTING.

That is all done with. No more counting the seconds. Now, the snap of the instantaneous shutter and it is done. Instead of the operator, the pawn broker is liable to *hold* the watch.

AFFIXING STAMPS ON THE PHOTOGRAPH.

That was one of the most brilliant ideas that ever emanated from a Washington brain. All that genius, taste and skill could bring together was being used to produce artistic mounts for the picture, but each and every one must be embellished by the sticking on of a blister plaster. The money they cost, the labor they required and the work they defaced is hard to estimate. It is said to have gone into oblivion, but

Where it's gone or how it fares
Nobody knows and nobody cares.

I regret to name as nearly a lost art the beautiful, yes, wonderful, stereoscopic picture. That is too good to be allowed to pass away. It has not been appreciated as it deserves. It is to be hoped there are men yet in the profession who will revive it and receive the thanks of thousands.

THE MAGNITUDE OF THE ANGLE OF VIEW.

By Robt. H. Bow, Edinburgh.

Taking three inches as the extreme width of opening of a lantern slide, it is desirable to know what angle of view can be comprised in this space. When the ordinary view lens, giving barrel distortion, is used, I offer the simple rule: Divide 171 by

the focal length ; or, if we know the angle and require the focal length of the lens, that will just grasp it : Divide 171 by the degrees in the angle of view.

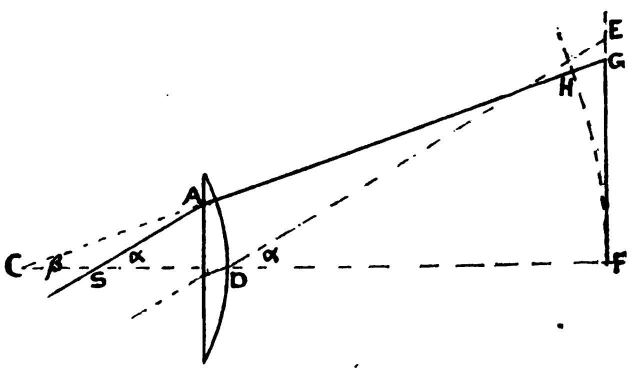
If we represent the width of the picture in inches by w, half the angle of view by γ, and the equivalent focus by f, we have, with a near aproximation to correctness :

$$2\gamma = 57\,w \div f.$$
$$f = 57\,w \div 2\gamma.$$
$$w = 2\gamma\, f \div 57.$$

In the case of non-distorting lenses, the width of the picture will be equal to twice the tangent of γ multiplied by f.

Thus when $f = 10$ and $2\gamma = 40°$, $w = 7.28$.
and when $2\gamma = 60°$, $w = 11.55$.

So that while the latter view is 50 per cent. greater in angle, the picture is 58.6 per cent. greater in width. But it will be



found that, with the ordinary view lens, and the stop at a proper distance from it, this augmentation is very nearly neutralized by the contractive distortion, which increases rapidly with the obliquity. I was struck with this when examining some curvatures of the image blotted on the method I described in the *British Journal of Photography* for 1863, pages 228 and 254. And the following calculation of the very simple case of a non-achromatic plano-convex lens, will also show the action of this neutralizing effect.

In the accompanying diagram, C is the center of curvature of the convex face of the lens AD. S the position of the stop

chosen, so that the marginal oblique pencil SA will, after refraction of A, proceed in the direction of the radius CAG to the point G, and so gives the largest focal distance AH; for this SA is taken equal to CA divided by μ the index of refraction.

The undeviated ray DE, drawn parallel to SA, gives the point E where G would fall if there were no distortion.

$$\mathrm{DF} = f\,;\ \mathrm{FE} = f \tan \gamma\,;\ \mathrm{S}\ \mathrm{in}\ \beta = \mathrm{S}\ \mathrm{in}\ \gamma \div \mu.$$
$$\mathrm{FG} = \mathrm{CF} \tan \beta, \text{ but } \mathrm{CF} = r\, f = \mu\, f.$$

Let $\mu = 1.53$, and let C represent the constant ($= 57$ above) when the width of the picture $= w$.

$$\text{Since } w = 2\,\gamma\, f \div \mathrm{C},\ \mathrm{C} = 2\,\gamma\,(f) \div w.$$

But $f = \mathrm{CF} \div \mu$, and $w = 2\,\mathrm{FG}$, $\therefore\ \mathrm{C} = 2\,\gamma\,\mathrm{CF} \div \mu\ 2\,\mathrm{FG}$,

and at $\dfrac{\mathrm{CF}}{\mathrm{FG}} = \dfrac{1}{\tan\beta}$, we have $\mathrm{C} = \dfrac{\gamma}{\mu \tan \beta.}$

Calculating the values of C from these data, we get:

$$\text{For view angle or } 2\,\gamma \begin{cases} = 20^\circ,\ \mathrm{C} = 57.22 \\ = 40^\circ,\ \mathrm{C} = 57.00 \\ = 60\ ,\ \mathrm{C} = 56.70 \\ = 80\ ,\ \mathrm{C} = 56.50 \end{cases}$$

The constant we see falls in value a little with increase of angle of view, but in practice the error would be in the opposite direction since, to humor the curvature FH of the image, the sensitive plate would as the angle increased, be pushed nearer to the lens than the focal length DF, and so take in a large angle, for the same width w.

To ascertain the equivalent focus of a lens, it is a common practice to rotate the camera through a considerable angle, say, $=2\,\gamma$, and measure the distance between the two positions taken up successively by the image of some prominent object; this distance will in our diagram be represented by twice FE, *or twice* FG!—the plan is really only applicable with such an angle to non-distorting lenses; applied to an ordinary view lens, the focal length so arrived, at would be too short. And, if in order to better focus the object at E or G, the focussing screen be pushed in a little, this would for any lens cause a corresponding error of deficiency in the resulting value for F. In using this method only a very moderate angle of rotation should be adopted, not more than 20°, 10 on each side of the middle position; then one way to get the equivalent focus is to multiply the distance for 20° between the images by 2.84.

If with a larger angle the lens and its stop be first tried in the ordinary position, and then reversed, a difference in the measured distances will indicate the presence of distortion.

If the stop be brought unduly near to the lens, the distortion will be reduced, but the curvature of the image increased.

The distorting action of the ordinary view lens is not altogether evil; it allows of a wider angle of view, and from crowding the pensils together towards the margins, it must, to a notable extent, moderate the inequalities of the illumination.

EXPOSURE.

By the Rev. J. Carter Browne, D. D.

In an ever-varying climate of sunshine and cloud, mist and rain, the crux with most amateur photographers is the length of time to be given to exposure. I particularly mention the amateur, because the professional photographer, who is exposing almost all day and every day, has so much experience in the matter, that it becomes almost a second nature with him to diagnose the light correctly. But with the amateur, who only now and then sets up his camera, the case is different. So many conflicting elements enter into the problem, and even when fairly resolved at one time are liable to be forgotten at another. The actinic power of the light is well known to vary at different seasons of the year, and it is this amount of actinism which is so difficult to guage by merely personal equation. Place also and subject enter largely into the question; in fact very nearly as much as anything else. It goes without the saying, to those who have made seascapes their study, that, under similar circumstances of light, a much shorter exposure is needed at the seaside than inland, or in an open landscape compared with the interior of a wood. But besides the actinism of the light, there are the various sized stops to be considered—the sensitometer number of the plate used—the different degrees of rapidity of the lenses, and the relation of aperture to focus. So that comparatively easy as it may be to develop a properly exposed plate, the real difficulty lies in the exposure itself. In this direction a gentleman in London has produced a card, on which several graduated discs are made to revolve, by means of which, when the *x*, *y* and *z* of the sensitometer number, the actinism and uniform standard stop is

given, and the subject matter to be photographed known, a very close proximity is found to the requisite time of exposure. I made use of one of these cards last Summer, and found it to be an almost indispensable adjunct to my kit. I was using two particular batches of plates made by two of the leading plate-makers in England, one of which gave the sensitometer number of the batch, the other not. This latter I had to guess at. But having fixed on a number which I believed must be very near that which would have been registered by Warnerke's sensitometer, I quickly found a *locus standi.* After developing one or two plates by way of trial, being away from home at the time, I so completely got the range, so to speak, that I left all the rest to be developed at leisure and in comfort on my return. I will not say that I found the time indicated by the exposure scale in question quite correct, but after one or two trials, by reducing the time given by about 30 per cent., with scarcely an exception, my plates were properly exposed. I should no more think of going out now for a picture without this valuable little telltale, than I should of leaving the camera itself at home. There are several of these exposure scales in the market, but only one have I found to combine all the necessary elements with almost unerring precision. For obvious reasons I must abstain from giving the name of inventor or vendor of the one to which I refer. I only say to those who are perplexed as to the time of exposure necessary to be given, get one and you will never regret it.

A SIMPLE MULTIPLE CAMERA.

By Prof. S. W. Burnham.

It is sometimes very convenient to have negatives of the proper size to make lantern slides by contact, and this can be easily managed with a camera carrying a 5x7 or 6½x8½ plate. I have found it very convenient to take along a small, single landscape lens of about three inches focus, and make four pictures on a 5x7 plate. The small lens is fastened near one corner of the square lens-front of the camera, nearly opposite the middle of one-fourth of the plate. As this front is changed in position, it is brought successively opposite each quadrant of the plate.

To keep the light from the other portions on which pictures have been, or are to be taken, it is only necessary to have a piece

of thin, black cardboard of the size of the plate-holder, and slide this with the plate-holder into the camera. One quarter of this card is cut away, and of course is placed opposite the lens when an exposure is made. This protects the other portions of the plate completely, and in every respect, pictures made in this manner are as satisfactory as if taken with a small camera in the usual way. A single plate-holder will contain material enough for making eight lantern slides, leaving the other holders for the longer focus lens. The plate with the small pictures may be cut into quarters before development, or developed the same as the others.

HOW PERMANENT HYDROQUINONE ORIGINATED.

By Dr. Heinrich Byk.

Of all the developers which have made their appearance during the last few years and were recommended, only a few have been able to retain the favor of the public, and none have succeeded to displace our old and approved friend, the pyro.

Only recently it had the appearance as if a substance, of which very little mention was made until then—hydroquinone—would maintain its place victoriously against pyro and many predicted hydroquinone as "the developer of the future."

The first tests were indeed favorable, the development of the pictures was successful without any trouble, and the labor required less care, an over exposure being without influence on the development of the picture. Herr *Vogel*, Jr., communicates to me even the surprising result, that by exposing equally sensitive plates he obtained the same good picture, no matter whether the exposure lasted 2 or 90 seconds. With over exposures the development proceeds only much quicker and has to be interrupted sooner.

With the increasing consumption it was evident that the means of manufacture had not kept even step with the wants, and that the hydroquinone produced now in large quantities had many defects, threatening to make its continual application questionable. The first article appearing in the market was a grayish white powder, succeeded by a white well crystallized product. But the defects of the hydroquinone showed themselves even in this white, chemically pure quality.

The preparation decomposed very quickly, and even in hermetically sealed and colored glass bottles appeared black spots. Such a contaminated product was the cause of defective developments and foggy pictures.

I tried to remedy this condition by adding a minimum quantity of sulphurous acid and I succeeded actually, after repeated tests, to produce a hydroquinone, which, with from $\frac{1}{8}$ to $\frac{1}{2}$ per cent. of sulphurous acid, crystallizes in handsome lemon-yellow colored needles and is completely durable. It defies light and air, and even when strewn loosely upon a piece of paper it does not change after weeks.

In this way originated *Permanent-Hydroquinone*, under which name it has been patented, and the pleasing reception it has had from professionals and the press will secure a future for it.

DRY-PLATE MAKING IN THE FAR EAST.

By Professor W. K. Burton, Imperial University, Tokio, Japan.

Readers of the INTERNATIONAL ANNUAL may, I think, be interested in a brief description of a dry-plate factory in a country so far away as Japan, especially as there is, I believe, no other such factory in any country in the East. About a year ago a corporation calling itself the "Japan Dry-Plate Company" started a factory, and I have had constant opportunity of seeing the way of working.

The factory consists of a large two storied house; it was a Presbyterian Mission house before it became a dry-plate factory. The lower story is mostly occupied by offices, store rooms, etc., but the glass washing and drying rooms are also situated there. The glass is coated in comparatively large sheets, 12 inches by 10 being the smallest size, and is cut up after it has been coated. The plates remain for 24 hours in a strong solution of washing soda, they are then washed thoroughly, by the aid of a form of vegatable sponge that is very cheap in this country, and is of the greatest use. A plentiful stream of water pours on the plates as they are being scoured, work that is done by women. When they are thoroughly clean they are placed in racks to dry. There is no polishing, nor is any substratum used.

The rooms upstairs form a series opening into each other. The first of these is the emulsion making and melting room. The emulsion is made by a modified ammonio-nitrate method. Only a portion of the silver is converted into ammonio nitrate. The temperature of emulsification is, however, made unusually high. The process lies, in fact, half way between the boiling and the ammonio-nitrate methods. The ammonia portion of the silver is first emulsified, the rest is then added *dry*. The ripening takes place remarkably quickly and, when it is considered that it has gone far enough, the temperature is not increased after elumsification, the bulk of the gelatine is added dry. It melts very rapidly on account of the high temperature. As soon as it is melted, the whole of the emulsion is poured into alcohol. It is worth mentioning that high class alcohol is purchasable in Japan at the rate of about half a crown per English gallon. The emulsion is generally in the alcohol within half an hour of the time of emulsifying. The emulsion is allowed to remain 24 hours in the alcohol. By allowing this comparatively long time, a comparatively small quantity of alcohol suffices. At the end of 24 hours the tough composition is torn into shreds, and it then remains for another 24 hours in water changed several times. Three different grades of sensitiveness are manufactured, but the manipulations are exactly the same in all three cases, except that the quantity of silver converted into ammonio-nitrate is varied, according to the sensitiveness needed. The quantity of silver generally emulsified at a time is 100 ounces, or more strictly speaking, 100 times 400 grs. and it makes about 12 gallons of emulsion.

In the same room as that in which the emulsion is made, is an arrangement for melting and filtering. Two vessels of water are kept at an even temperature by being connected, by copper circulating pipes, with a small heating vessel outside the room, which consists of a central copper tube, in which charcoal burns, with a water jacket around it.

In each of the vessels within the room there is placed a china jar that will hold about a gallon. One is for unfiltered emulsion, the other for filtering the emulsion into. Chamois skin has been found to be the only reliable filtering medium.

Coating is done by girls who sit one at the end of each of two travelling tables made according to Cowan's design. The emulsion is poured from teapots. I remember some one somewhere

recommending Japanese teapots for coating plates. The difficulty here is to get these of European pattern. The Japanese teapot is the very worst form for coating with. The spout is connected with the body very high up, so that bubbles, which are always liable to be on the surface of the emulsion are poured on to the plate. Moreover the position of the handle, at right angles with the spout, makes it more difficult to regulate the quantity of emulsion poured on the plate than with a handle opposite the spout; besides this, the effect of the right angled position of the spout is that the shadow of the hand holding it falls on the plate.

The excess of emulsion is not poured back into the teapot but into a bowl, whence it is carried to the unfiltered emulsion jar. It is the sole duty of one girl to look after the filtering, the filling of the teapots and the emptying of the bowls. The Japanese, especially women, are exceedingly apt in all kinds of delicate manipulation, and learn coating much more quickly than a European. One girl can coat 60 dozen 12 by 10 plates in a day, and two are able to do all the present work of the company.

The plates are taken off at the far end of the table and are there examined for defects. The emulsion is scraped, with a piece of glass, from all defective plates and goes to the jar of unfiltered emulsion.

From the coating room, the racked plates go to the drying room. This room has large inlet and outlet ventilators, covered with cloth to trap dust, and is warmed with hot water circulating through cast iron pipes from a boiler placed outside the building. The drying is generally complete in about 6 hours, but the plates are left in the drying room for 24 hours to insure very thorough desiccation.

From the drying room the plates go to the cutting and packing room, where they are again examined for defects, are cut to size and placed in boxes.

Throughout the whole building, lanterns in the form of large rectangular boxes of wood are used. The light is that of candles, and the color screen is canary medium for all operations except the examination of the plates, for which it is stained red glass.

With the exception of the emulsion maker, the glass cutter and the boiler attendant, all the workers are women.

SNOW PHOTOS IN THE DOG DAYS.

By George A. Carruthers.

"Some kind of a refrigerating machine, I suppose, that you get into and have all the milk of human kindness the poet speaks about in your inside turned into ice cream," was the humorous remark of a querist seeking to know "how it was done," on being shown some of the above. No, nothing so disagreeable as that, though if properly done, the effect is as natural as if the thermometer registered furs and whiskies hot, instead of lawn tennis and iced drinks.

Those who can afford such luxuries, should by all means have a series of backgrounds representing snow-clad country, trees, etc.; but failing them, a common blanket placed out of focus will be found most useful, and being partly non-actinic, will give a tint bringing out the snow covered figure in strong relief. The monotony of a flat background may be relieved if a couple of small dead trees, of course devoid of leaves, are placed behind the sitter, if a person standing can be described as such, and painted with a little whiting and water on one side of the trunk and branches, as they would be in nature. The subject, which, of course, must be dressed in his or her most wintry costume, furs overcoat, etc., as the case may be, is now placed in position, for, say, a three-quarter length figure, and focussed.

A little strategy will now be found necessary; wait until the cook or whoever has charge of your *cuisine*, is at the top of the house, and purloin the salt box; don't ask for it on any account, or you will be presented with about enough to cover a tea plate, and told that the rest is required for some very particular culinary operations on the morrow; however, get salt, honestly if you can, but get it, the more the better, and proceed to cover your subject with it, from the top of a stepladder if necessary, sprinkling it wherever it can be made to adhere to the dress; then expose, and if the negative is satisfactory, make a rough print, which may be fixed without the trouble of toning, being only for reference. It will be found there are patches where the "snow" ought to be but isn't, and it is here the artistic knowledge of the operator will be called upon, who, it is hoped, can handle a brush smaller than a house painter's. Any body color paint may be used, but the most satisfactory will be found to be vermilion, which enables you to see your work as it is

applied, a cake of this costing about 2d., the higher priced article not being necessary; should be broken up and dissolved in water to the consistency of cream, to which add a dozen or so drops of glycerine, which will prevent it drying too much and so chipping off the negative; the whole when bottled will keep indefinitely, and will be found most useful for blocking out skies and other objectionable objects. With this paint and a fine sable brush, go carefully over the figure, painting it on wherever the snow ought to be, make another trial print and so on until everything is satisfactory.

Falling snow can be put in by dotting the negative carefully with the red paint, or if this is considered tedious, which it is if the plate be a large one, it may be applied by using a strong hog hair or poonah brush charged with vermilion, and splashing it on the negative with the finger. It is better to sacrifice reality to effect during these operations and to avoid letting any paint go on the face, which, however natural, would sadly interfere with the result as a portrait.

If a full length picture is desired, it is advisable to make the figure stand on something white, such as a sheet or white paper, with the red paint carefully hiding the join between fore and background. An open umbrella will be found a most useful accessory, and besides imparting an amount of reality to a wintry scene, if properly held, imparts the requisite amount of half tone to the face which is otherwise difficult to obtain in the open air without proper screens.

The number of subjects that will suggest themselves as suitable for the above treatment might be enlarged upon *ad infinitum*, and amply repay for the extra trouble involved in their production, and if naturally and artistically done the operator will be rewarded, and need affect no surprise at seeing those to whom they are being exhibited, turning up their coat collars, stamping their feet, and doing everything in their power to keep themselves warm.

A FEW THINGS TO AVOID.

By F. P. Cembrano, Jr.

Daylight for your dark room lantern ; artificial light is more constant and under control.

Ruby light for your lantern : yellow or cathedral green is more pleasant and enables you to see what you are doing.

Too pretty looking negatives : generally they are underexposed.

Changing from one developer to another : if a formula give you good results, stick to it.

Trying experiments on negatives which cannot be repeated.

Doctoring negatives when they can be taken over again.

Confusion in your formula, in your dark room, and, in fact, everywhere.

Using very small diaphragms when taking landscapes.

Excess of pyro or quinol in subjects with strong contrast.

Printing on albuminized paper when you can use platinum or bromide.

Economy in your developer : have sufficient quantity to cover well the plate.

A stoneware or marble sink : any negative, measure or bottle falling on it is sure to get broken.

Halation by using a suitable plate and developer.

Too much reliance on what others say : try for yourself.

Excitement when using a hand camera.

Processes in which bichromate is used when your hands are cut or chapped.

"Shine" in prints, when by having a mat surface you can obtain more artistic results.

Retouching, but give all your attention to the lighting of your subject.

Underexposure : no developer can get out of a plate what is not there, whereas over-exposure can be better remedied.

Keeping a large stock of very rapid plates : they don't keep.

Soaking your plate in water before development : it has no advantage and often causes pinholes.

CAMERA CLUBS AND PHOTOGRAPHIC SOCIETIES.

By Wm. Chamberlain.

The great increase in the number of amateur photographers and the rapid advances made in the art of photography has shown the advantages to be derived from a mutual interchange of ideas and the recording of new formulas. The numerous

photographic journals and our indispensable annuals record to a great extent all the new developers, toning baths, etc., but the amateur has neither time or money to spend in trying them all, and therefore he seeks the advice of his nearest photographic friends for the solution of why this or that developer does not work according to his expectations.

As it is often said that "misery loves company," which in photography means plates spoiled in developing, overtimed exposures, or the toning bath won't tone to a good color, it may also be said that "success loves company" to display the result of correct exposure and successful development. The club or society affords this satisfaction in helping its unsuccessful members to mend their ways, and the successful ones to remember how they sometimes have poor results. In all towns where there are half a dozen or more studying this fascinating science a club can easily be formed, and those who have been working alone will soon realize the advantage of exchanging ideas and experiences.

With an energetic president, who should be selected for his working ability and a happy faculty of being able to keep up the enthusiasm, much good can be done, and with moderate initiation fee and dues a small sum will soon be provided. The first investment should be a subscription to one of the journals which can be read and discussed at the meetings, and the president should appoint a certain subject to such a member as he considers has time and inclination to gather information or make experiments, and to put the result before the club in a form which may be entered in its records. At each meeting, after the business routine is through, the member so appointed can give the result of his work, after which questions and criticisms may be made, and these give the new beginner an opportunity to find out the best road to follow. The secretary should be instructed to correspond with other clubs and solicit an exchange of ideas, and a copy of the recorded result of any subject considered might be sent to such clubs as are willing to send one of theirs in return, which can be read by the secretary and criticised by the members. A few chemicals and developing trays can be obtained, so that plates may be developed in the club room, and the making of lantern slides by contact will prove a fascination not to be resisted.

All lantern slides should be numbered and a corresponding

number placed on a stout piece of white paper the size of the slide, containing a short description of the subject. These pieces of paper, or thin card, can be placed by the side of the slide, thus acting as a separater and preventing breakage when they are carried about.

Outings should be arranged on convenient holidays when a number of or all the members can go together with their cameras, and the practice this affords in the selecting and exposing for a really picturesque bit will bring out the good or bad points and give the new beginner an opportunity of learning what to take and what to leave alone.

The purpose of these remarks is to induce brother amateurs to form clubs, and seek to profit by each other's experiences.

UNTRUTHS OF PROFESSIONAL PHOTOGRAPHY.

By J. Wells-Champney.

There are two truths so frequently violated in photographs made in "galleries" or "studios," that it may be well to point them out. We have accepted and must still longer accept them, if there can be but little practical use made of the knowledge further than to alleviate the falsehoods.

All artists and observers of out-of-door lighting must have noticed that cloudy or, as we are in the habit of speaking professionally, "gray" days give a top lighting to objects and figures, whilst, as a rule, all the earth is less bright than the sky. This great principle of illumination has given tone to modern French landscape art since the discovery of photography, whether due to that discovery or no. The light is diffused, but the upper surfaces of figures, rails, tree branches, etc., receive most light.

The relations of figure to surroundings, especially to the sky, differ very much under these conditions from the ordinary photographic picture, where painted backgrounds are employed.

On the other hand, where sitters are arranged with accessories purporting to imitate an ordinary room, the illumination is, in the "gallery," so largely from above that again photographers stray away from average truth.

In other words, the photographer's "studio" illumination

stands fairly well for the truth of "gray day" lighting, but for that his painted backgrounds falsify the relation of figures to the so-called trees and sky.

When, on the other hand, the objects photographed are genuine chairs, tables and real wall paper screens for backgrounds, there is still an error in giving a top light, which is rarely to be found in our parlors and "sitting rooms" in which ordinarily such furniture is used.

NOTES ON KEEPING SENSITIZED PAPER.

By H. J. Channon.

Many amateurs now use only ready-sensitized paper for printing, although it is generally admitted that paper sensitized at home, on a neutral bath, will produce on the whole superior prints; but the quickness with which it discolors is a serious drawback to its use. Having lately tried some experiments as to the effect which various materials produce on sensitized paper when in contact with it, some of my results may perhaps be of iuterest as showing what is likely to be beneficial, or the reverse, to the keeping qualities of sensitized paper or unfixed prints. Ordinary single albumenized paper was used, floated three minutes on a 60-grain bath, and also plain salted paper (with a slightly sized surface) floated one minute. Plain salted paper appears, I think deservedly, to be now becoming rather popular. These two articles are sometimes very differently affected by similar treatment. A piece of albumenized paper keeps white for a considerable time if clamped tightly between clean pieces of glass, but if a part of it be exposed to the air, that part rapidly discolors; with plain salted paper it is exactly the reverse, the exposed part keeps comparatively well and the clamped part soon darkens. Sensitized *albumenized* paper has always a beneficial action on other sensitized paper in contact with it, preserving the whiteness of either plain or albumenized; not only when freshly sensitized itself, but also after keeping so long as to be thoroughly yellow with age, or after printing to any depth. Before sensitizing, and after fixing, it has, however, no preservative effect, so the virtue is probably due to the free nitrate or other silver compounds. Some other experiments confirm this. Sensitized *plain paper* has a very different effect, while white it has little or no preservative action and after being printed it is

most injurious, and will soon produce a stain on white paper if in contact with it. In fact a rough copy of a plain salted paper print may be made by pressing an unprinted piece against it for a few hours. Albumenized paper, well darkened by light, is an excellent material for making masks (spoiled prints, etc., often come in handy for the purpose when printing photos with white borders), but plain paper would evidently be quite unsuitable for that purpose. From the above notes it appears that plain paper prints are best kept, before fixing, lying loosely, well apart and exposed freely to the air, but albumenized paper prints should be closely pressed together.

For printing from really good negatives I think there is no doubt *pure white* paper is to be preferred, while in other cases, where it is necessary to degrade the whites of hard prints, that is easily done by sunning. Our London dealers, however, appear to feel much greater pleasure in selling the tinted article, and often send *pink* albumenized paper when *white* is specially ordered. Color perhaps hides a multitude of faults. Now, in addition to the mischief of degrading whites which would be far preferable pure, I find the dye has also the serious fault of being injurious to the keeping qualities of paper. Tinted paper discolors much more quickly after sensitizing than white, and an unsensitized piece of it will soon cause discoloration on any sensitized paper placed against it.

In order to try the effect of various chemical substances on sensitized paper, I prepared a number of test sheets by placing on pure white blotting paper drops of solutions of various chemicals, including most of those used in photography, mostly in 10% solutions, or, if not soluble to that extent, saturated solutions. These test sheets were thoroughly dried, and pieces of sensitized paper were then pressed between them and clean glass plates, and the results noted after keeping for some time. Some of the chemicals were found to have a remarkably beneficial effect, the best being strongly alkaline salts, viz.: caustic potash, carbonate of potash, washing soda and bicarbonate of soda, the paper in contact with these salts remaining quite white for a long time after the surrounding parts of it had become badly discolored, and these white parts were much more sensitive than the rest, especially in the case of albumenized paper. Carbonate of ammonia has, however, probably owing to its volatile nature, a very *injurious* effect.

Acetate of soda produced remarkably good results, and two other organic salts, citrate of soda and oxalate of potash, were at first equally good, but after a time lost their preservative effect. Haloid salts all proved injurious, producing measles and insensitive specks, as was to be expected from the appearance of paper which has been floated for too short a time. Sulphite of soda has excellent preservative qualities, and in some cases has also a *strong sensitizing action*, especially on plain salted paper. This is a property which I have not noticed in any other chemical, except acetate of soda, which shows it to some extent. A small portion of sulphite would probably be a useful addition to the salting solution, when working with plain paper; it, however, soon loses its virtues.

Neutral chromate of potash was found to be one of the best preservatives, and chromate of silver equally good. Paper stained with the latter material should therefore be far more suitable for making masks than the orange and black papers generally used, which I found had certainly no *preservative* influence.

The effect of acids and acid salts was generally to preserve pure whites, but at the expense of the sensitiveness, which was always more or less injured, and in some cases totally destroyed. Salts of an oxidizing nature were uncertain in their action, generally rather beneficial when first prepared, but injurious after keeping.

Some of my results were rather surprising. I found, for instance, that "hypo," the terror of photographers, has on the whole a decidedly beneficial influence on sensitized paper in contact with it, and that ferrous sulphate is a fairly good preservative for plain paper.

The chief practical conclusion arrived at was that there is nothing to beat the old plan of keeping sensitized paper between sheets of paper salted with washing soda; and, having had some experience of this method, I strongly recommend it. Printing paper is better for the purpose than blotting paper, being much more easily handled while wet. I have been using advertisement sheets of the *Photographic News* for the purpose, and found them to answer quite well, but a careful printer would probably prefer to use unprinted paper. The paper should be immersed in a solution of soda of about 20% strength, taking care that each sheet gets thoroughly soaked. It may then be drained in a mass

for an hour or two, when the sheets can be easily separated, and should be hung up to dry. Sensitized paper, pressed between these leaves, may be kept for a long time without anxiety, and bright prints may be obtained from the slowest negatives, if pieces of the prepared paper are placed behind them while printing.

TRANSPARENCIES FOR WINDOWS, HALL LAMPS, ETC.

By B. E. Charlton.

A delightful amusement, especially for ladies. No apparatus required beyond a sheet of glass, a piece of board, and some prepared paper for Blue Prints, which latter may either be procured from any dealer in photographic supplies, or may be prepared, with a small amount of trouble, according to the recipe given below:

To make transparencies: From the garden or greenhouse, select a quantity of delicate leaves, fronds or vines, such as ferns, leaves of the clover, strawberry, head of oats or wild grass, pieces of smilax, vines, etc. Even pieces of lace are useful.

Lay upon a table a sheet of clean glass of any desired size. Arrange upon the glass the leaves and vines according to fancy, Upon the leaves place a sheet of Blue Print paper of the same size as the glass, face downwards, and upon the paper place a thin board; also of the same size as the glass. Lash all together by passing a string several times round each end of the package, close to the margin, at the same time pressing all tightly together, so as to make each leaf lie close to the paper. Expose the package, glass uppermost, in bright sunshine three minutes. Remove the package from direct rays of the sun, not necessarily into a dark room, untie the package and wash the sheet of paper in two or three changes of water and the result will show all the graceful outlines of the vines and leaves, beautifully photographed. Dry the paper, lay it upon an ironing table and sprinkle over it some crumbs of paraffine—bits of a paraffine candle will answer well. Then with a smoothing iron, warm enough to melt the wax, iron the paper as you would a pocket handkerchief. The transparency is now finished and may be attached to the inside of a windowpane, etc., with charming effect.

Should it be desired to make the Blue Print paper, the following recipe will answer:

Red Prussiate of Potash	$1\frac{1}{2}$	ounces.
Citrate of Ammonia and Iron	1	"
Water	8	"

Dissolve separately each in half the water and mix. Place in a shallow dish and float on the surface thereof, sheets of unsized white paper, a good quality of the paper used in newspaper printing offices will answer. When a sheet has floated for five minutes, hang it up to dry, and then place between the leaves of a large book, in a drawer or other dark place. All the operations after the two solutions are mixed, such as floating and drying the paper, must be done in a dark room, or by feeble lamp light.

"THAT IS OLD."

By Mrs. Fitzgibbon-Clark.

Is that so, Mr. Editor? because you know it, or that it has been published before, is that any criterion that it is old? I venture to say that there will be hundreds of persons who will read this copy of the *MidsummerAnnual,* who have never, or hardly ever before, read photographic literature; then why repeat, "that is old" because you happen to know it, or that it has appeared before in print. Don't you know that many good things are soon forgotten, by a large number of our craft, and need to be republished? How often we hear of some one having searched back numbers of the *Annuals* and photographic magazines and finding some good but forgotten process or formula, springs it upon the less informed, as some "new and wonderful discovery," which they are willing to part with for a consideration, said consideration anywhere from five to twenty-five dollars or more, according to the gullibleness of the person approached.

Enameling processes, coating wooden trays, developing formulæ, triplex pictures, making two exposures of the same person on one plate and hundreds of others come up now and again to astonish (?) as something new, but which have been published years ago—are they old? if so, why do so, many get taken in by them?

As simple and useful as is adding a few drops of glycerine to the last wash water to prevent prints from curling, and which has been published time and again, I venture the assertion, that nine-tenths of the photographic fraternity would not be able to tell you of this simple preventive; but if some "smart Aleck" should produce it as a "patent of great value," he would doubtless find many buyers at $5 each.

It has been said "there is nothing new under the sun," old formulæ, processes, etc., appearing in a new dress. Well, admitting this to be the case, are they old? especially so to those who have not been so fortunate as to have heard of them before; to the larger portion of our craft, at least, are they new and valuable. Now I am going to repeat what has often before been published. It is old, yet it is new. When reading—and the more you read the better—have a note book and pencil handy, and jot down the title of such things as strike you at the time, as good and useful, together with the book and page where found. In this way you will soon have a little book of notes of exceeding great value, which will, in all probability, save you many dollars, besides assisting your memory to store up knowledge which will aid you in your everyday manipulations.

There is a class, however—and a large one—who do not read; they, of course, will no doubt continue to be duped.

SILVERING ALBUMEN PAPER.

By John R. Clemons.

As you have requested me to contribute an article for THE INTERNATIONAL ANNUAL, I comply with pleasure and present a short essay upon a subject, that to my knowledge, has not been presented to the photographic fraternity. It has often been asked, "What amount of silver does a sheet of albumen paper take up?" My method is as follows:

In the first place, the silver was forty grains to the ounce of water, by Pyle's silver test, and made in the usual way, that is, nitrate of silver and water.

Not distilled water. Take as much common water, such as is supplied in cities, fill a large glass bottle, to this add about ten grain of nitrate of silver and give it plenty of sunlight. It will soon discolor and in a day or two all the organic matter

displaced and fall to the bottom ; of this I make my bath. I find it as good as any distilled water for the making of a positive or negative bath.

The paper used was N. P. A. double albumenized. This I float three minutes, that the silver may penetrate and coagulate it thoroughly, then it don't soften up while toning. This is done in a moderately warm room.

Of the above brand I took twelve sheets, and got the weight exact to a grain ; after thoroughly drying it, silvered 3 min. on 40 grains and 64 ounces of solution, and drew it over a glass rod, and placed over smooth poles 1¼ inches in diameter, smoothly papered. The paper is placed nearly diagonally, or so the corners that hang down are placed together with a clip; in this way the sheets dry evenly, and have very little curl ; after being bone dried, they are reweighed to find what amount of silver the dozen sheets have taken from the bath, also the amount of solution that was lifted from the sixty-four ounces.

Here is the result:

12 sheets weighed before sensitizing	8 ounces,	425 gr.
12 " " after "	9 "	259 "
12 " displaced from bath	5 "	

RECAPITULATE.

After sensitizing weighed	4579	grains.
Before " "	4265	"
	12 | 314	"
Per sheet	26⅛	"

Amount of solution used, 5 ounces.

Number of grains, 314.

To each ounce of solution, $\frac{5 \mid 314}{62\frac{4}{5}}$ grains, showing that amount of silver must be added to each ounce of the 5 ounces of solution, to make it normal or in the condition you found it, before you floated the twelve sheets of albumen paper.

DRAWING TO A FOCUS.

By Ralph D. Cleveland.

In looking at photographs, taken both by amateurs and professionals, I see so many spoiled from not being in proper focus, that I am induced to write a short sermon on the subject, and

give an old prescription (but none the less good from age) by which the patients as well as patience may be benefited.

I am frequently shown prints or negatives which look "blurry" and asked: "What is the matter with that?" and when I say "you were not sharply focussed," the patients are very apt to be offended and think they know when they are in focus as well as any one, and feel very sure they were on that occasion.

A picture of a still object or landscape in focus should show perfectly sharp lines all over (unless, of course, part of the object is very close and another part very distant), when examined with a magnifying glass. I am aware this is not considered correct from an artistic standpoint, but I assume that in photography we are after exactness and not artistic vagueness, or we should design to focus out of focus, if I may so express it.

This sharpness can be attained with any fairly good lens by proper care in adjustment, and this is so easily done, that it seems useless for a single plate to be spoiled for lack of it.

There is point in the field of all lenses, varying according to the length of their focus, beyond which everything is in focus; and when this point is established beyond a doubt, mark it on the camera bed with the scratch of a knife, and ever after use that mark as "focus" for all objects at that distance. I have a mark on my camera bed which I made over five years ago (after focussing carefully with a magnifying glass) for all ordinarily distant landscapes, and I have never failed in making a sharp negative when I have used it.

I also have the camera bed marked for focus at 2, 3, 4, 6, 8, 10, 14 and 18 feet, in the same way, but this cannot often be used as it is not always convenient to measure the distance, but when it is, I know the fucus is exact. I marked this by setting up by camera in a comparatively dark room and measuring the distance from the lens to a lace curtain in the window, on which I focussed with the aid of a magnifying glass, and wherever I can measure the distance from my lens to any object now, I set my camera on the mark and I know it is in focus.

To adjust your focus for landscapes, take a magnifying glass and focus on some object about two hundred feet away that shows sharp against the sky, and when you think you have it make a little mark. Try this over several times until you know yon are right and then make a good mark that will stay.

All beyond this will be in focus, and you can easily tell by looking at what distance the foreground will be out.

This is an old prescription, as I said before, and I lay no claim to anything original, but I see so many wasting time and patience, not to mention plates, by not using it, that I make bold to present it for those who still suffer without it.

A FEW HINTS IN REGARD TO FRAMING AND MOUNTING.

By J. Albert Cole.

If the economical amateur is able by the following directions to enhance the beauty of his productions at the expense of a little time and less money, my purpose will have been accomplished.

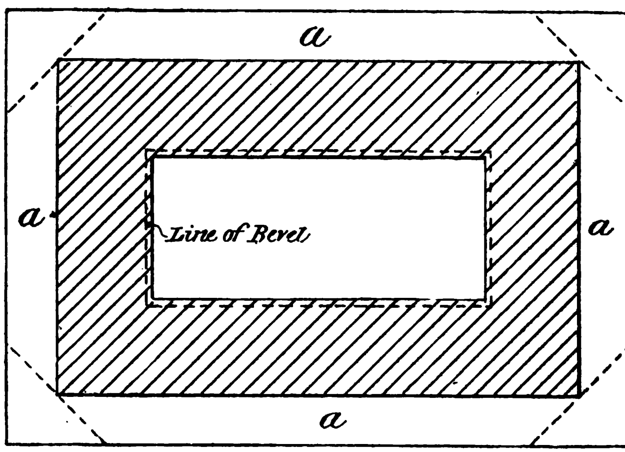


Fig. 1

A plain passe-partout greatly assists in "setting off" a picture which otherwise would be but a plain print, and may be made with little effort.

Obtain from a bookbinder sheets of heavy bookbinders' board at least $\frac{3}{16}$ inch in thickness, cut it and the picture opening in same to the size determined upon; the next step is to bevel the edge of the opening, which can be easily done with a sharp

knife, first, however, drawing a line around the opening as a guide for the width of the bevel. The next operation is to cover the rough mat thus made with Whatman's drawing paper, or any other rough surfaced and tough paper; in order to do this proceed as follows:

Cut your paper from 1½ inches to 2 inches larger all around than the outside of mat; lay it upon a clean board or table and wet it on one side only until it is quite limp; wipe off all superfluous moisture with a cloth or dry sponge; then place your mat upon it, bevel towards the paper, and cut off the corners as shown by dotted lines (See Fig. 1).

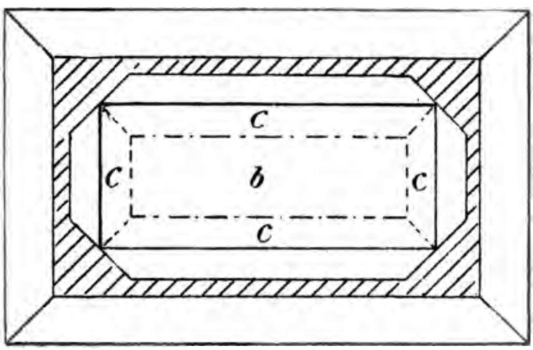


Fig. 2

Cover projecting flaps "*a*" with an even layer of mucilage or liquid glue and turn them over on to the mat, pulling and stretching them as much as possible, and rub down firmly with paper knife; then draw a line inside the mat opening, and from 1½ inch to 2 inches from the beveled edge, as shown by dotted lines on Fig. 2. Cover the covering paper between mat opening and dotted lines with glue as before, taking care also to allow the glue to cover the bevel on mat, especially at the corners; then with a sharp knife cut out the inside piece "*b*," and cut the mitres; turn flaps over on to mat, pulling tightly as before. This may be best done on both inside and outside by working from the opposite sides, instead of commencing at one side and going around the mat; now turn your mat over and rub down the bevel edge, being particularly careful at corners to wipe off carefully all glue that may squeeze out.

All that now remains to do is to place your mat under pressure on a flat surface and allow it to dry.

If a plate mark is wanted it can be easily put on when the mat is partly dry by using the edge of a blunt chisel-shaped piece of hard wood, with a ruler as a guide, "drawing" it on as you would use a pencil to make a line.

A neat and artistic effect may be produced by mounting bromides or platinotypes upon Whatman's or Harding's drawing papers, and then putting a plate mark around them. Stretch the paper upon a board by wetting it thoroughly and then gluing edges to the board; when it is partially dry mount the picture with paste; put a plate mark around it in similar manner as before described; when thoroughly dry, cut off to the desired size; the print will always remain flat and will not cockle, and can be framed or left flat.

THE PLACE OF IMAGINATION IN PHOTOGRAPHY.

By C. H. Cox.

It is probably the opinion of the majority of those who think anything about a photograph, that its value consists in its sharp and literal definition of actual facts and that the more it records of these the better. Whether such a belief is founded upon any true appreciation of the question is very much open to doubt, and perhaps a few remarks on another view of it may not be out of place. It takes very little consideration to see that between the best photograph of this kind and a picture by a true artist, there is some material difference, but it is not so easy to tell in what that difference consists. The painter cannot put in all the detail which a photograph gives, and the more he has to do so the worse, as a rule, for his picture. All feeling leaves it and it becomes a mass of hard, dry detail, true enough in parts, but as a whole singularly unpleasing. And yet it may be said that he has tried to represent nature as it is, and that the photograph gives it as it is. Into the differences between the artificial eye, *i. e.*, the lens and the living human eye, I am not going to enter, but merely to state that their conditions are by no means the same, and that a photograph "sharp all over," on which so many pride themselves, is not what the eye sees at all. The power of selection belongs to the intelligent mind, but is absent

in the mechanical process. It has been well said that "Art is the knowledge of what to leave out." The lens cannot leave out anything; the mind alone can perceive what is requisite in this respect. The photographer, however, fortunately is not a being destitute of mind. His process is mechanical, but at any rate he can try to make it artistic. This he can do to a very large extent by following the example of the artist, and appealing as far as he can to the imagination. By the imagination I mean the power of realizing what is only partially seen or suggested. If, in your photograph, you have every detail you can possibly crowd in, you leave no room for this faculty of imagination to work at all, and as it is a mental pleasure affording high enjoyment, of which you deprive those who look at your work, you leave them with a sense of something wanting after all your skill. Various ways have been tried to overcome this difficulty, some advocating an "out of focus effect;" some shading in printing; some artificial methods of light and shade. There is another method, however, deserving of study, and that is the arrangement of the subject so as to leave some of the principal objects only partially visible, and that the remainder may be suggested, rather than seen, thus appealing directly to the imagination to reproduce them.

One man will plant his camera straight in front of the object he wants to picture. He will try to get everything in he possibly can and all microscopic in detail. Another will more wisely search for a view in which he can have some partial concealment here and there, which the eye will trace out with a pleasure unknown in the other case. You may walk along a street behind a girl of singularly graceful figure and dress, and your mind jumps to the conclusion that she has a face equally lovely. But the reality may be a woful disappointment. Well, if you had never seen more than the back, your pleasure would have remained unblemished. Now, if you wished to photograph her for a picture, would you not choose the back view with just the suggestion of a face, and then every one would have the same pleasant illusion permanently? But a likeness or portrait would spoil it altogether, and yet it would be a picture of her all the same. In a landscape, by adroit management, you may do similarly; you can choose out a view in which the beauties are visible, but so that some kindly object may conceal or veil what is less pleasing, and then the mind will have nothing but beauty

suggested to it. Why insist on having everything in, or that it would not be like the place if you had not?

In portraiture of groups the rule is to arrange all so that every one can be equally seen, and the wonderful pyramidal contrivances, with the front row sitting down and the second standing up, with the tall members behind, are well known and as much to be detested as artistic compositions. Imagination here is sent begging. In groups purposely arranged to be pictorial, the photographer nearly always errs in wanting to show too much. I have seen an admirable love scene, in which the faces were purposely hidden except just a suggestion of expression. How would it have looked if each had been photographed with a look of affection put on for the occasion? Nothing but a vulgar piece of acting would have been the result, as it is, the mind supplies the feeling, which is not seen, and all to the advantage of the picture. How would you go about photographing a pathetic subject, say of grief? Would you get the model to simulate the feeling and contort the face into an imaginary correct look? No; conceal the face and throw the expression into the attitude, and you have pathos suggested to the mind which nothing else would convey. In fact, the imagination is touched and makes the picture for itself. I could multiply instances, but have written too much already. I would only say give the imagination a chance to make more of your pictures than you show, and in proportion you will give a pleasure which not only will add to your reputation as photographer, but will prove, also that you have attained one of the secrets of the artist.

HOLIDAY HINTS FOR AMATEURS.

By J. W. Crowse.

Having had numerous inquiries as to the necessary equipment of an amateur when on tour, and the International Annual being published about the time when tourists are making their preparations for their Summer holiday, I came to the conclusion that an article on this subject would be acceptable.

Amateur photographers may be divided into two great classes, the Bees and the Drones. There are many young beginners who have patiently worked out the necessary preliminary exercises in the science of photography, and have thus constructed for

NEGATIVE BY O. H. PERRY

PHOTOTYPE BY W. KURTZ

NEWPORT ROCKS

themselves a solid, reliable foundation of useful knowledge and experience, which will help them in solving the more complex problems, and in mastering the many elaborate and delicate processes which occur in the advanced stage. These are they, who, having selected a certain make of dry plate, stick to it and master its peculiarities, treating it first with one developer and then with another, until they understand how to make a good negative with it; this done they feel satisfied that they have one reliable and trustworthy friend to depend upon; upon which they can with confidence fall back in an emergency, when in doubt as to the character and behavior of any new "best in the market" plate they may be experimenting with. These are they, who, instead of putting the blame on the plate makers or the lens, first make sure that they themselves are not in fault. In short, these are the Bees. It is to this class I address this article, well knowing that they are not too conceited to take a hint from a brother amateur.

There are others who purchase a complete set of apparatus of the latest fashion bristling with screws, springs, catches, spirit levels, and possessing an endless extension of bellows, etc., the more brasswork and polish the better, together with dozens of all the latest advertised extra rapid dry plates and dark tents of wonderful construction. These are they who seriously inform you that you have only to get a decent "Box o' Tricks" and a book, don't you know, and any one can do photography, as it is, now-a-days, made too stupidly simple to require any practice in the affair; and so they set out in their happy ignorance to explore remote parts of Norway, or to climb the most inaccessible peaks of the Alps. These are the Drones, who are far too knowing to accept any suggestion made by any one not of themselves.

I should advise anybody whose holiday is limited to two or three weeks, to take as little apparatus with him as consistent with the object in view, *i. e.*, to secure pleasant souvenirs of his Summer vacation. I will now treat *seriatim* of the absolute necessities.

In the first place, the camera. This should be a plain, square shaped one, with parallel bellows, reversing back, double swing, and rising and falling front. The baseboard should fold up to protect the focusing screen. The size I prefer is 5x4, as it makes an artistic sized landscape and is large enough to take a fair sized group. The solid double backs are more convenient when on tour,

as they are less liable to be opened by accident, and, having no hinges, are less liable to admit stray light than those of the book form. They should be fitted with carriers, to carry quarter plates or lantern size plates. Many tourists prefer a changing box to the dark slides. These are very convenient and may be safely used in bright daylight. The changing boxes hold a dozen plates, and a dark slide fits on to a groove in the bottom of the box; when the shutter is withdrawn two plates fall into position; after exposure the slide is placed in a groove at the top of the box, and the shutter being withdrawn, the exposed plates fall into the box, the slide is again changed from the bottom, as before.

The tripod should be rigid yet portable, one with folding legs having the lower portion sliding, will be found most useful. For use with a 5x4 camera, a half plate tripod will be the best size, the extra size of the triangle giving great stability.

The most important item, of course, is the lens; and as there are so many well known makers of good lenses, a choice is somewhat difficult. However, whatever form of lens is decided upon, I must urge my readers to obtain a good English made one. If expense is an object, get a single combination view lens, this is, in fact, the best lens to use for pure landscape work. Next in utility comes the rapid rectilinear lens, suitable for landscapes, buildings, groups and an occasional portrait (an amateur temptation which I say "resist"), in fact this is par excellence the amateur's lens. A most useful addition to either of them is the wide angle lens, to be used for interiors or in confined spaces. This lens is more useful to the amateur than the wide angle lens, which requires great care in using to avoid exaggeration of perspective. I may mention that the lenses I use are by Messrs. Taylor, of Leicester. The rapid rectilinear and the mid-angle both fit one flange and are magnificent instruments at a very moderate price. These lenses may be had with iris diaphragms or Waterhouse stops. The latter Messrs. Taylor send out covered with black cloth, which renders them light-tight and are luxuries in the way of stops, which can only be appreciated by those who have used them. I have no interest in recommending Messrs. Taylor's goods, more than being anxious to recommend the instruments with which I have done the best work. Doubtlessly many amateurs, and professionals, too, have their own pet lenses; to those I say stick to them; but for the benefit of others who contemplate purchasing a lens I repeat, go to a reputable firm and get the best English made lens

you can afford, rather than secure a so called bargain through doubtful sources at a less cost.

With regard to instantaneous shutters my advice is: "Leave them at home." But as I cannot expect all to take my advice, if they will take a shutter I should recommend the due-ratio shutter of Mr. Forrest as being the most suitable. It is a serviceable shutter, good enough for anything, and is strongly made, so is more adapted for tourists' use than many of the more delicately constructed ones. I have developed many amateurs' instantaneous shots; the results, however, were so disheartening that I at last insisted upon the operator being present during development, or I should soon have earned the title of despoiler rather than developer. I found the average to be: Spoilt plates, 95; poor negatives, 3; fairly good, 2. Many plates had no subject at all on them, many others were hopelessly fogged.

A focussing cloth must not be forgotten. I use one made of black velvet lined with yellow twill, the size being one yard square. These two materials are stitched together so as to form three pockets the whole length of the cloth. In these pockets I pack my tripod, roll it up and strap it, thus carrying tripod and cloth together. A piece of elastic, 4 in. long by ½ in. wide, fastened at each end, runs along the edge of the twill side about the middle, which forms a loop which is passed over the lens, thus securing the cloth in windy weather.

The next thing to be considered is the dry plates. My advice is take with you the plates you are most familiar with, and do not be over anxious to secure the ultra rapid variety. Select a well coated plate of a moderate rapidity. Among many other equally good plates are the Ilford, Pagets and Thomas' thickly coated landscape plates, all of which I have used and found reliable. Do not take more than you think you will require, and endeavor to bring back as many pictures (not mere photographs) as you took out plates. Do not risk spoiling a plate because you have plenty more.

As for chemicals, solutions, etc., it would be conducive to much better results if they were omitted altogether from the traveling list; if the tourist would be content with only exposing his plates and leave the after processes to be done at home with the necessary conveniencies, time and inclination, we should see a much better show of negatives. The inconveniencies when traveling are so numerous; the extemporized dark room, deficient

water supply and hurry often cause plates to be carelessly developed, half fixed and very imperfectly washed, consequently they gradually bring forth a rich crop of spots and stains, and gradually fade into ghosts of what should be things of beauty and joys for ever. But as it is advisable to develop an occasional plate as a guide to future exposure, we must have at hand the means of doing so. For this purpose I can strongly recommend Oldham's Dry Powder Developer, which is most convenient and portable. I have developed some eight or nine different makers' plates with this preparation. It is a dry powder which requires simply the addition of water to make a perfect developing solution which gives very good results, with freedom from fog, frilling or stain. It may be used for transparencies also, and for bromide papers. Having developed the plate, well wash, and having examined as to density, etc., let it dry in the dark and pack it up to be fixed when at home. It will not hurt if not fixed for a week or two, and you will thus avoid taking any hyposulphite with you. If, however, it is wished to finish it off, take just as much hypo. with you as will make sufficient fixing solution, and when used throw away. I find hypo. has a disagreeable trick of getting everywhere when not wanted, and doing much mischief when traveling about.

A shade to protect the lens from side and top light will be found very useful. It may be made by procuring a piece of cardboard about eight inches wide and the length of three sides of the camera, bend into three portions and inside the creases glue strips of tape forming two hinges; fix the center portion on to the top of camera by means of drawing pins near the edge of cardboard (which should have a slit cut to allow the rising front to pass through), and let the two sides fall down into position. This shade enables the operator to focus more sharply, and gives crisp, sharp negatives.

A plummet to insure a vertical position to the swing-back may be thus made: Get a piece of umbrella rib, which you will find flat with a hole in the top; cut off a portion long enough to reach about two-thirds down the side of your swing-back; then in the center of swing-back, near the top, screw in a small jewelers' hook and hang the rib on it. This will then swing freely without touching the wood. Having placed the camera truly vertical, the swing-back being closed, fix a pin with a bead head just below the point of the rib. This will show when the back is vertical,

the rib and pin being in line. Next make a staple by bending a portion of a hairpin into shape and filing the two ends sharp enough to drive into the wood. This should be fixed over the rib so that it may swing about a quarter of an inch each side of the bead. You have now an efficient indicator and no excuse for drunken architecture, etc.

I conclude these hints, hoping they may be of some service to those on pleasure bent, and if I have been tedious in making my meaning clear I must beg your forbearance and excuse myself by reflecting that my aim and intention has been to help those who are commencing the practice of photography and who, perhaps, have not the time or opportunity to consult higher authorities on the subject or to make experiments themselves.

THE WIFE'S STRATAGEM,

OR, THE DETECTIVE CAMERA.

By Emily Culverhouse.

Mr. Theodosius Brown, who lived in Margate town,
  A self-conceited dude and masher he,
With hat so small of brim, and eyeglass focussed trim,
And evidently thinking all eyes were turned on him,
  As daintily he wandered by the sea.

And ever and anon, he turned his eyes upon
  (For vanity was his besetting sin)
His pretty little toots—cased in patent leather boots,
Poised tenderly, as if he'd pulled—a corn out by the roots,
  Or a winkle on the summit of a pin.

He never felt afraid to accost a lonely maid,
  Fondly deeming his appearance was so taking
That it was a compliment—to be asked by *such* a gent
If he might bear her company wher'er her steps were bent,
  And tell her "how" his heart for hers was breaking.

But this naughty Mr. Brown, as he walked up and down,
  Avoiding ocean's ever damping foam;
Forgetting for awhile, as he basked in her sweet smile,
With a rapturous expression, entirely free from guile,
  The "skeleton in cupboard" at his home.

For he had an ugly wife, an incubus for life,
  Whom he married for her *figure,* not her face,
Her income "quantum suff" (that's the Latin for enough)
Kept house, and gave him luxuries, gloves, cigarettes, and snuff,
  Equivalent, he thought, for "want of grace."

Her life at home was spent, and she was quite content,
  While Theo daily strolled out smart and natty,
And matters prospered well, till a scrap of paper fell
From his pocket, and the words thereon transfixed her like a spell,
  'Twas merely "*Thursday, from your loving Hatty.*"

Now, although she loved her home, disliking much to roam,
  For her hump and grimaces called attention;
There rose a supposition—a kind of intuition,
That Theo was not faithful, she seemed to have suspicion,
  And immediately determined circumvention.

But how! and where! and what! her poor cheeks waxed hot,
  As plan after plan chased through her brain.
At last she gave a shout "Eureka, I've found out!"
I'll quickly now discover what Theo is about,
  And punishment shall follow in his train.

She had a friend, a cousin, of removes about a dozen,
  On whose aid she could rely in time of need.
And quickly she decided—if she in him confided,
The necessary requisites would be for her provided,
  And her stratagem be certain to succeed.

With this fertile scheme intent, to see her friend she went,
  A photographer residing in the place,
A very *taking* man, who listened to her plan,
And saying, "Cousin Mary, we'll *expose* him if we can,
  And bring him to a sense of his disgrace."

PART II.

Oh, very deep the sting, when despite the wedding ring,
  A wife finds out her husband's vows are naught,
And resolving on frustration, acts without hesitation,
There's positively to the length, no stay, or limitation
  To which a jealous woman will resort.

——Bowed down with *seeming* trouble, and with ***sham*** rheumatics
double
She paced the shore next morn in ancient guise,
Blind as a bat could be—to all surroundings she;
Yet one who watched her narrowly, could very quickly see
An ominous wild glitter in her eyes.

And ***her hand roved to her heart***, with involuntary start
As she recognized coming up the street
Her Theo's mincing gait, and saw him stop and wait
For a pretty girl who smilingly came tripping to him straight,
No doubt an assignation there to meet.

Following in their wake, she saw them stop and take
A sheltered seat—again her heart she prest,
Made a sound like viper hissing, as all thought of wife dismissing
He a practical sweet lesson gave upon the art of kissing—
(Which is really waste of time, *probatem est*.)

So she wandered near the pair, with assumed unconscious air,
And often torn with jealous pangs would start,
For they kissed with loving zest, that oft her hand she pressed
With a gleam of satisfaction, it must be confessed,
On that region of the body called the heart.

PART III.

No trace of his disgrace could be read, for Theo's face
Was as innocent as "Mary's little lamb,"
When he reached his home; and she—looked busy as a bee;
'Twas perfectly impossible for any one to see
Their behavior to each other was a sham.

Anon, in words so wary, "Theo, my dear," said Mary,
"Cousin Tom has sent us both a kind invite
To see local lantern views, which he says will much amuse,
And we shall meet our neighbor; I'm sure you'll not refuse
To take your little wifey there to-night."

Not in vain did she implore, for knowing what's in store,
And delighted that he did not act contrary,
Calmly by his side she sat, though her heart went pit-a-pat,
And her countenance as placid as an artful old tom cat
That has made his supper off your pet canary.

Poor Theo tried dissembling, as with inward fear and trembling,
He beheld a loving pair upon the screen,
With their faces turned away ; when much to his dismay
Another, and another came on in quick relay,
And *recognition* animates the scene.

At length he rose to go, but the audience said "No!"
Compelling him by force to keep his seat,
"I'm sure they're not amiss, why we all shall learn from this
The very many changes to be rung upon a kiss ;
We did not dream of having such a treat."

And the din they all did raise, as at each succeeding phase,
They shrieked out their laughter loud and long,
Till with contention rife, Theo said, "upon my life
Do I owe this shabby treatment to her I call my wife?"
(Men always talk like this when they are wrong).

Mary answered, "You must air your grievances elsewhere,
For surely our dear neighbors and relations
Will all declare, I ween—they never yet have seen
A wife who tried so earnestly her husband's faults to *screen*
And succeeded far beyond her expectations.

A whisper to those wives who find their lord connives
To hoodwink them that they may flirt at pleasure,
Don't indulge in low invectives, get a *camera detective*
"In flagrante delicto" you'll take him in perspective,
To develop and enlarge him at your leisure.

It is easy to be had, used as a liver pad
Or a plaster that is meant for chest protection,
And as second thoughts are best, why set your mind at rest
By quieting your conscience, should it enter a protest,
By saying "All was done upon reflection."

COPYING BY LAMPLIGHT.

By S. Delicate.

Copying can be done by artificial light. Perhaps, not in all cases, as well as by daylight, yet, by the exercise of a little care

good results may be obtained. Anything in the way of photographs, engravings or colored pictures may be copied by lamplight, or by gaslight. Colored pictures, however, are best taken on plates prepared for the purpose. In the following description it will be seen that for copying in smaller sizes no special apparatus is required, the ordinary camera, lens, and tripod only being brought into use. For copying *same size*, a camera with longer extending body will be needed.

The first things necessary for the work are a room and a piece of clear wall space, or an easel, such as used for enlarging purposes. On either of these the picture to be copied is fixed, at a height of about five feet from the floor. This done, the illumination is proceeded with. Two good petroleum lamps answer the purpose well. One is placed a little to the right of the pictnre and about a foot from the wall, or easel, as the case may be. The other is placed a little to the left in the same manner. They may be brought into position by the use of two small tables, being so placed as to leave the floor space in front of the picture clear. Empty boxes or other suitable articles placed on them serve as stands for the lamps. The flames of the lamps shonld be about level with the center of the picture so that equal illumination may be insured. As soon as the light is thought to be satisfactory, the camera on the ordinary tripod stand is brought up in front, and as the space here has been left open, it can be moved forwards or backwards as required. When the picture is arranged on the screen the size desired, it can be ascertained if the light is sufficient for the work to be done. If the image is seen distinctly on the ground glass, the light is enough. But this is an important point. It should be seen so that the focussing can be done without any difficulty. This is the gauge for exposure. The focussing may be done with full aperture, and if the copy is to be a small one, as a lantern slide, the exposure may be made with full aperture also, provided a lens of not less than half plate be used. But if a larger size than this is required, a a stop must be used in order that the resulting negative may be sharp up to the margins. In copying by daylight, a small stop is generally used, and $f/32$ gives good results, but this would make the exposure too long, so it is best to use as large a stop as is consistent with good definition all over the image. Whatever the size of the stop the image must be seen plainly on the screen. Not necessarily as clearly as when focussing, still it must appear

distinctly, so that the stop depends on the illuminating power used. The next consideration is the time of exposure. This is modified by the rapidity of the plates used. But let it be supposed the plates are of medium quality, a plate that is halfway between a slow landscape and an instantaneous one. The picture to be copied is 12x10 inches, and it is decided to take it on a half plate (6½x4¾). Five minutes exposure will be somewhere near the mark. Then, if a copy for a lantern slide should be required, seven and a half to ten minutes must be given. From these examples the time for other sizes may easily be calculated.

A word as to development. This must be done with great care. The solution must be strong in pyro and well restrained. Plenty of time must be given, and the image must come up slowly and distinctly, and a good negative will be the result.

HINTS TO AMATEURS.

By Louis F. Drake.

I have been informed that the INTERNATIONAL ANNUAL would be pleased to receive an article from my pen, but my informant did not state *which* pen it should be from.

Now he should have known that I use both a sharp and a blunt one; and should the former be used, I fear lest the article be too pointed, and if the latter, too blunt. A happy medium in the form of a half stub, would, perhaps, be best. As this is an article of sundries, a word about the best size camera to buy will not be out of place.

Probably the hardest thing for a novice to decide upon is the size. He will probably want to make large, medium and small pictures, and proceed to buy a 6^2x8^2 or an 8x10, and inside kits enough to keep a small family in firewood all Winter. That's what I did, and I didn't use half of them. A 5x8 is the best size for general use, and with a few 3 x4^4 kits is all that is needed. Don't bother with 4x5's; its not near as pretty a shape as the 3^4x4^4. A little bit of personal experience will serve to illustrate the point and may not be uninteresting.

The writer began his photographic career as an amateur, some few years since, with a little black box having a pinhole for a lens. Finding that a complete photograph could actually be made with so crude a rig (we won't call it an outfit), what could

not be done with a larger and better one having a real lens?

The larger and better one was ordered and came in due time. It was a 5x8. I now could do some fairly good work, and began to accumulate some pretty things for my album and any quantity of spoiled plates for the rubbish heap. After a time I began to improve in the art and wanted a still larger and better outfit. An accommodating dealer "swapped" with me.

I now had a 6½x8½ box with other things to correspond. I was happy. I now had a nice big camera like a professional. After carrying it over hill and dale for a time I began to wonder if it was not too large and heavy.

My camera and I decided to take a trip West one Summer. I took my wife along. Camera didn't have one.

Having so much luggage to carry and the camera being so heavy, we concluded to put it in the trunk. The trunks were duly checked to Iowa, while we changed our plans somewhat, and stopped in Chicago for a day or so.

Here, while strolling around in the beautiful parks, we wished for the camera to aid us in enriching our album with views of the many pretty things we saw; but alas, it was many miles away. We decided to carry it hereafter, let it cause what trouble and weigh what it might.

In Iowa it did good work, and down the grand old Mississippi the neat little brass shutter was kept busy blinking at the passing boats and the many pretty objects on shore.

Into Colorado from St. Louis we lugged it, and many are the pretty things it caught and preserved for us. Scenes around Manitou, Aztec rock inscriptions from the Rio Grande, Mexican adobe or mud houses and most cherished of all, it preserved our camp scenes away up in the Rockies.

We were loth to leave our friends, but when the snow began to fall we again started West, lugging the heavy camera, and landed in California amid oranges, flowers, green trees and sunshine, at a time when our friends in the grand old Empire State were basking in ice and snow. Here we parted forever from the heavy camera and have instead the nicest, prettiest, lightest and most compact 5x8 you ever saw. One which it is not a burden, but a pleasure to carry.

We used glass plates, which added materially to the weight of the outfit, and at last outweighed it. The new celluloid films

had not come out, so, of course, could not be used. Paper negatives were out of the question, because we wished to develop as fast as the exposures were made, and to use which necessitated a larger supply of bottles, chemicals, etc., and cannot be worked successfully in a hotel bedroom and on a good carpet.

The new films supply a long felt want. We amateurs want more than that, however. We want a film thin enough to be used on spools, and one in which stripping and other unnecessary manipulatians are avoided.

An excellent developer for general use, especially when traveling, is given below. Excellent because there is no pyro solution to spill and soil clothing, and because it gives nice gray negatives.

Sulphite soda (cryst)	1¼ oz.
Sal " "	¾ "
Water	8 "

For use take of the above 3 drams, dry pyro 12 grains, water 3 or 4 ounces. The excess of sulphite soda is to prevent stain. Have the pyro done up in powders of 12 grains each, and thus save the trouble of weighing it out every time. Always have a little bottle of bromide handy, as it will save many an over-exposed plate.

Hypo is cheap, and can be bought at nearly every drug store and dissolved as wanted, so don't bother with carrying it in solution. Two light rubber trays that fit into each other are necessary and light and easily carried. A little red light can be had for about 60 cents that burns oil which is taken up by an absorbent and will not spill. A candle light is not desirable.

Should you have the misfortune to break your light, as I did, fair developing may be done until you can get another by pinning a sheet of ruby paper over the transom of the door, using the hall light. The paper can be obtained at any drug or fancy store.

Negatives may be inscribed by printing *backward* on the film side with black ink. A little practice only is required. A good way to learn is to print on thin paper, turn it over and trace the letters. They may also be inscribed by printing or writing on sepia skin and then moistening the film, press the paper on with the ink side to the film.

Blue prints may have any additional inscription added by

simply writing on them with a clean pen, using a strong solution of sal soda for ink. The writing will be white.

Pretty little souvenirs of a trip or an outing may be made for friends from unmounted blue prints by simply punching one edge of a number of them and tying with a bit of gay ribbon, making a hood. A tasty cover can be made by making a little picture of an old bridge, house or pretty clump of trees in the center or corner of a plate, and marking out all else, leaving it white. An appropriate title or dedication may then be printed on. These make a pretty little book costing but a trifle, and your friends will be tickled almost to death to get one. Mine were.

The above hints are for the benefit of the amateur on wheels.

Now for a few to him at home and we are done.

At your home rig up a dark room in some out of the way place in the house where you can slop, slash and spill chemicals to your heart's content and have no one to scold over the muss you make. If piped water cannot be had, get a large tobacco pail, insert a faucet and hang up. Now build a wooden or get a cast sink and you are fixed. Don't depend upon a professional for anything. Do all your own work yourself. Never mind if you do fail a number of times to get the required result. Keep at it and success will follow.

Every bit of our art is beautiful, except, perhaps, the silver and pyro stains on the fingers. They will wear off if you wait long enough, but if you are in a hurry for them to vanish just rub on some iodine and then a strong solution of cyanide potass. Wash the hands *thoroughly* after using the cyanide. Don't use it, however, if there are any sores however small on the hands, as this chemical is a deadly poison and should be used only with the greatest care..

Indelible ink may be removed from fabric in the same manner.. This formula is to remove silver stains. The pyro may be removed by using a piece of pumice stone or a little oxalic acid solution.

As I said before, do all your own work. It is such a satisfaction to be able to make a complete picture without assistance from any one.

Try not only the silver print, but the bromide, platinotype and others as well. Don't buy the ready sensitized albumen paper. Silver it yourself and better results will be obtained.

The prettiest part of making the platinotype is developing the

picture on the hot solution of oxalate potass. Only a faint image can be seen after it is printed, but the moment it touches the hot developer the picture appears as if by magic.

Again I say, do everything yourself, and don't forget that "Patience and perseverence accomplish a great many things," and with the addition of money and other sundries makes lots of pictures and a pretty album.

HAND CAMERA WORK (*Continued*).

By A. R. Dresser.

Last year I wrote on this subject, and as I feel sure it is one that is now coming to the fore, I will continue the same subject.

I have been at work all the past season trying to work with hand cameras and find the more I work with one the better I like it. I find it rather hard at times to work with films, and so now have a camera that holds 24 plates (without any backs) and find it works very well, and is the best kind of hand camera for those who prefer glass to films; not that I have given up films as I use them when away from home, and intend to do so, as I find I can work them to perfection; but for home work or when out for only one day I prefer glass.

I still believe in wide angle lenses for hand cameras, and for a ¼ plate would *not* use a lens of over 5 inches focus, and prefer one of 4¼ or 4½. I have tried a great number of lenses, but have not yet found one that works so well as my own, as described last year; but I am just having a lot of new ones and am in hopes of getting one as good or better (if possible). I can safely say a wide angle lens of 4¼ or 4½ inches focus and working at F. 8 is the proper lens for a ¼ plate hand camera, and those who go in for 6 in. or 7 in. focus lenses will find themselves often in trouble, and I would not use one of 6 in. focus on any account.

I gave full description of my hand camera in your ANNUAL last season, so there is no need to go over it again; the only improvement I have got is now having a camera very little larger, in which I can carry 24 plates without any double backs and which are changed quickly and with ease. The maker of it is Mr. Thistleton, of Quebec street, Oxford street, and if it works right along as well as it does at first it is the hand camera of the day without doubt.

When working with a hand camera it is *best* to have a good finder that gives exactly the same picture that you get on your plate, and then you will know what you are doing. This applies mostly to when you are using a stand. Next have a level let into the top of the camera so as to level your camera when taking time-exposed pictures and hence get straight lines. As to the want of a swing back or rising front I cannot see the want of it. I take photos of all sorts of things, houses, views and animals, etc., etc., and have none and have not found myself come to grief yet, and why make all sorts of different movements in your camera to puzzle you when none are needed? In the old days of photography they had no swing backs, etc., etc., and yet they got good pictures, and I, for one, fancy the general run of amateurs as often come to grief with using their swing back, etc., etc., as they do with not using it; of course a swing back and rising front is often of use, but one with a little care can do without it, and in hand cameras it would be more trouble than it was worth, and should you find that at any time you had not got your lines quite straight, do your printing through the camera and then you can alter your mistake and make it right. There is something to be learned with an hand camera when working instantaneously, and that is to learn to know when to shoot, as almost every object is still the $\frac{1}{100}$ of a second at some moment, and learn to know when that is or rather to know when to take the photo, and you will then find you can work instantaneous pictures for certain. I am so used to it now that I seldom lose a plate.

I consider that the afterwork of hand camera negatives is enlarging and lantern slides, as very few are content with a ¼ plate print from the negative taken, and besides, as I have this season proved, it is possible to enlarge from this style of negative and compete with success against those who work in larger sizes. That being so, it is necessary to consider the sort of negative you should try to get, and I think (for certain, but then I may be wrong and so *only* give my opinion from *experience* not theory) you should try and get a negative full of detail, but certainly thin; the reason for this is that to enlarge on bromide papers you require a very thin negative full of detail and one that would be of no use for platinotype printing, and as I consider for amateurs the only way of enlarging is to do so *direct* on bromide papers, therefore he must make his negative thin to suit the

work he wants to do with it. This style of negative will do just as well for lantern slide making when you copy through the camera (as I do). Now all this means when developing use less pyro and more ammonia or potash, whichever you use, and get a negative for the work you require it for, and I suppose every one knows for bromide enlarging such a negative is required.

The next point we come to is enlarging; you will all find in the various year books any amount of articles on that subject, "so read and learn." I go in for enlarging through the camera direct on bromide papers, and find I can get what I require by so doing and so do it, and do not go trying first one way and then another and so come to grief. You can, if not enlarging above 8x10 or 10x12, and as a rule that is large enough to go to when working with a hand camera (although I often when I have a good negative enlarge up to 18x15 and 15x12, but then you require a good negative for enlarging to such a size). Enlarge direct through the camera as one would only require a 10x12 camera with a very long range of focus (about 36 inches) and I prefer this way, as I fancy you are able to get sharper results; but for those who have not a camera of that size and do not want to buy one then they must enlarge direct on to a screen, viz., put a camera (¼ plate one will do) against a hole in your dark room and throw the enlargement on a screen up to the size required. For full particulars how to work both these ways consult the last year's "Year Books," and you will find full instructions.

The only hints I will give are, when working the last way mentioned it is well to have a wooden cap made for your lens with a piece of yellow glass in it, and then, after focussing your image, you can put on this cap and so see where to place your bromide paper so as to get your image in the right place.

When you use bromide papers for a thin negative use a slow make of bromide paper, for a dense negative use a fast make of bromide paper. For developing, use hydroquinone, as it is cleaner and nicer to work with than iron, and gives as good results, any formulas will do except one where there is ammonia used and I have found when using ammonia with hydroquinone you are apt to get fog.

For general use I think amateurs will find the bromide papers the best. I use Eastman, Frys and the Ilford and find them all good according to the negative I use, but I can recommend the Ilford "Alpha" paper as very good results are to be got with it

particularly when using any formulæ of intensifying *before* the hypo, as given in the *Amateur Photographer* last year; but in enlarging all depends on practice and knowledge, and by a little of both one can use any of the bromide papers and get good results; but should one not succeed at first, do not give up in disgust but try, try again till you find you can work it and then it will be a pleasure, and I now do all my printing on bromide papers.

The great point is to learn how to put a sky in, as no picture looks nice with a clear white patch where the sky should be, and one should never make an enlargment or a lantern slide without putting in a sky when there is one in the original picture; it is easy to do when you have once learned how to do it. I have not space to describe the process, but others are sure to do so, so read their articles and learn the way; but one cannot give full directions how to succeed, as that must be learned by experience, as all depends on the negative used what exposure to give for view subject and for sky subject; but I can give one hint, and that is, procure a lot of sky negatives of same size as your negatives, and print them, and once learn the exposure required and mark on the edge of sky negative, and then you will know ever after what exposure your sky requires, and can soon judge by the look the difference between that and the view negative you are going to use.

I only enlarge by daylight and never use oil, and so cannot give any directions for so doing; but for those who can find the time there is no doubt the daylight is the light to use.

The next use for your hand camera negative is for making lantern slides, and this you can do by contact or through the camera. I for one prefer working by copying through the camera and take them by contact if I cannot help it, but for those who like contact printing a hand camera is just the thing, as they get a negative they can use for that purpose.

For lantern slide making, to procure good results, it is necessary to find a good make of plate, get used to it and stick to it. Develop with hydroquinone, as by so doing you get good slides with *clear glass* where it ought to be. I have written so often on this subject that anything I should say would be stale, so I will not do so, but will give a few hints :

1st. Always print a sky in a slide where it is required.

2d. Keep a reducing formula handy, and as a rule rather *over*

develop than *under* develop, and trust to reducing in preference to intensifying.

3d. For reducing make up a Sat. Sol. Ferricyanide of Potassium, for use take Sat. Sol. Hypo. 13, Water 23 and 10 to 15 drops of Ferricyanide Sol., and put your slide in this and watch, stop slightly before it is reduced, enough to allow for any reducing that may go on during the after washing. This reducing formula is the most useful one that one who goes in for lantern slide work can have by him, as with a paintbrush and a little practice he can use it for improving his slide by reducing locally any part he my wish; of course, it is impossible to give full directions for so doing, but one can soon learn the uses it can be put to by a little thinking. I know I find it of great use.

4th. For Intensifying, for those who can put up with a good black color, the way to do it is, after your slide is washed and dried, if you find it wants intensifying, bleach it with mercury (ordinary formulæ), *well* wash and *redevelope* with hydroquinone as used for developing the slide; you can develop it as thick as you like and still retain clear glass. Try it.

5th. For warm tones. Bleach with mercury, and then follow with a bath of 1 ounce of Sat. Sol. Sulphite Soda and one ounce of Sat. Sol. common washing soda.

Or: Bleach with mercury, well wash, and follow with water 2 oz. Sat. Sol. Liver of Sulphur 10 drops, which gives a reddish brown color.

There are about twenty ways of intensifying, but the resulting colors are about the same as formulæ given.

In conclusion, I am sure those who follow my advice and go in for hand cameras will never regret it, but will thank me for giving the tip; so I write these few remarks, feeling sure I shall not find any one who will call me to account for so doing.

TERMS MISAPPLIED TO PHOTOGRAPHY.

Edward Dunmore.

If all the wonderful diatribes that have been penned on photography and art were collected together in one volume it would probably be difficult to find a more extraordinary compilation in this or any other language. The absurd gush indulged in over and over again, about photographs, embellished with such

artistic slang as values, tones, harmonies, etc., that have as much application to photography as they have meaning in this connexion, which is simply none at all, and having only a tendency to discredit photographs and photographers sooner than otherwise. Time was when the writer used to indulge in a little mild writing of this character, but in the language of the noisy Generie, he has been converted from the error of his ways and can, with a certain amount of complacency, look back on what he then thought of the connexion of art and photography. The great mistake now, as it always has been more or less, is the application of terms only suitable to paintings, to picturcs in monochrome. Far be it from me to hint even in the most remote fashion that art rules do not apply to photography, for we all know a picture must conform to certain rules, which, if set at defiance, end in discomfiture and the pictorial effort becomes a laughing stock. My idea is that expressions and criticisms that apply to painting should not be mixed as they seem to be in inextricable confusion with those that apply particularly to photographs. There are some terms, it is true, which apply to each art in common, and may be very properly and pertinently used. Well, then, let us be content and not lose ourselves in a jumble of words whose principal characteristic in connexion with photography is sheer inanity. We have artistic and inartistic treatments of subjects, but when a photograph is said to be out of harmony and the water and sky of wrong value, it is somewhat difficult to understand what is meant. If it was said the sky was too dark or the water too light there would be no difficulty about it and we should at once know the opinion intended to be conveyed. Then again, the absurd and grandiloquent titles so often attached to photographs is something to marvel at, especially when the photographer attempts to depict human passions, of all things the most difficult to do even in paintings, and in photography well nigh impossible. The most successful attempt in this direction falls far short of what the painter can achieve who, with all the advantages he has at his command, finds it a matter of great difficuliy to give an adequate rendering of the sentiments he wishes to convey. It is one of those things photography cannot satisfactorily deal with. No doubt many examples will occur to the reader, out of which can he select a single one that will represent with anything like truthfulness the passion or sentiment supposed to be recorded?

I think not; the worst of it is the line between the sublime and ridiculous is so narrow that failure in the first is a safe landing in the second. That pictures must have distinguishing titles it is true, but let them be such that will fairly describe the pictures without the pretentious absurdity that seems of late years to have become rampant.

PHOTOGRAPHY AS A "BASIS" FOR ART (?) WORKS.

By Dr. P. H. Emerson.

It behooves every intelligent photographer to study thoroughly the artistic side and possibilities of photography, in order that he may be in a position to combat the attacks which are constantly being made upon his art, *quâ* art. I have endeavored in my recently published work to arm him for this fight and take leave to express a hope that he will arm himself at all points to fight the artists (?) who assail his art, and at the same time covertly make use of the camera to bolster up their weak fumblings after the beauties of nature. It is useless for the photographer to think that a thorough knowledge of science will do much for him in this fight; it will, on the contary, place him *hors de combat.* For the stealthy artist who attacks him will, directly he takes up a scientific cudgel for the battle, turn from superciliously muttering that the "science is but art."

No; the earnest photographer who would fight the pariahs of art, who use his tests and then abuse his work, *quâ* art, must fight the battle with artistic knowledge—it is, therefore, his first duty to arm himself with the necessary knowledge. Now, be it understood, that it is not here assumed that he will find all painters, etchers and other artists (?) against him; on the contrary, he will find the most advanced workers, and the most honest men who practice these arts, either for him or indifferent. The men whom he *will* find his bitterest foes are *bad* painters, *bad* etchers, *bad* sculptors and other kindred, *bad* practitioners of the arts. These are the men who use photography *stealthily;* who paint minitures upon a photographic *basis* (Euphemistic term !)—in short, a photograph made by the powder process; who cut wood blocks from a photograph pasted upon a block—and ruin all tonality and delicacy in so doing; who *trace* drawings of animals, men,

landscapes and directly from photographs—and then *boast of their boldness of design and freedom of hand,* who trace photographs upon etching grounds and then with the etching needle follow the lines of the tracing, in this way drawing on the copper with *remarkable* (?) force, directness and truth. These are the stealthy ones who must be looked after; these are the men who deny photography as a means of artistic expression; these are the men who never let you know they use photography—and their name is legion. I am not going into the *pros* and *cons,* into the legitimacy or illegitimacy of such proceedings; I only say that all such deeds should be publicly avowed and that all work produced of such methods should be known as "traced from a photograph."

The philosophical critics of the public will have a severe task in detecting work so produced, but they must never forget the fundamental fact that much of the art work of to-day is done in this way. Quite recently we heard a painter compliment another upon a certain drawing done for us for a special publication. The painter especially dwelt on the merits of the firmness and boldness of the drawing!!! The complimented one was silent; he did not explain *how* it was done—but hist! *it was traced from one of my photographs.* And now we come to the point—this method is called, we believe, using photography as a *basis*—a bit of artistic jugglery this. For example, in the advanced and ably conducted *Magazine of Art* for February of this year of grace, 1889—there appeared an interesting article on the "Portraits of Dante, Gabriel, Rossetti," from which we extract the following:

I recur for a moment to the photograph by Messrs. Downey first mentioned—that which appears in Mr. Caine's volume. This portrait was obviously the one which chiefly guided Mr. Menpes in producing an etched likeness of Rossetti, published towards 1876. Mr. Menpes, I presume, never saw my brother; at any rate they had no personal acquaintanceship. It is a long while since I beheld the etching by this gentleman, and I cannot now speak of it in detail; it is, I believe, an able work of art, and so far like my brother as it is like the photograph upon which it was founded. This was, till lately, the only instance in which the art of engraving on metal in any form had been brought into requisition for producing a likeness of Rossetti—if we leave out of count the skit by Mr. Sandys. Recently however—in

1887—another etching of his head was produced by some skillful French artist, I know not who. This is again from the Downey photograph. From an art point of view, it is quite approvable, but as a likeness of Rossetti it fails, being decidedly "dour" and rather fierce in expression. Thought and energy are abundant in this head, suavity and self-possession absent. So at least I think; but I have found that Mr. Madox Brown is more favorably impressed by the head as a likeness. The etching forms the frontispiece to Madame Clémence Couve's able and sympathetic (though not impeccably correct) French translation of "The House of Life." * * * * * * * * *

Mr. Dunn also painted, a year or so afterwards, a life-sized portrait in oil, head and shoulders, of Rossetti, founded principally upon that photograph by Lewis Carroll which has been here engraved; he presented this to my mother. It is firmly and well executed; and, although the complexion appears a little "brick-dusty" and wanting in refined gradation, I could not name any painted portrait which conveys a more immediate, or (within certain limits) a more decisive, impression of Rossetti than this one does. Much the same may be said of a second oil-head by Mr. Dunn, belonging to Mr. Theodore Watts; it is founded upon the same photograph, or perhaps more directly upon the other one deposited with the Stereoscopic Company. Here the complexion is paler and better, and the likeness again strong.

Now it does not appear, to us, exactly what use the photographs were put in these cases, we should like to know—that is all; but we do (alas! for human nature!) know of much that has been done in the stealthy way we have suggested above. We know, alas! of many etchings, paintings, etc., produced in this way, and we could show certain artists their "basis" well and grieve their hearts. Now, artistically speaking, such productions can never equal say, a photogram from the negative itself, and to this statement many of the very best artists do subscribe —that we know for a fact. Why then is it done? Gentle reader, shall we hazard a suggestion (a wicked one, perhaps?) Well, it is done because the foolish public has had driven into its dull head that any wretched painting, engraving or etching is a work of art, and that a photograph is not art, and so it *pays*. Mark that! "It pays," but my friends, the believers in such pedantic cant, are justified of their teachers and are filched of their shekels and so the merry game goes on.

ART IN PHOTOGRAPHY.

By E. M. Estabrooke.

The Nineteenth century has witnessed such wonderful things, that we are at a loss to imagine what can be brought forth in the next century that will equal in value and importance to mankind, the great discoveries and inventions of the present, among which our Art-Science photography stands well in advance among those that confer blessings and happiness upon the race of man.

As education is the source from which we derive all these wonderful advantages, and as it is only reasonable to believe that education will advance with an always accelerating impetus, so it is not unreasonable to believe that the coming century will surpass the present in discovery and invention as it, no doubt, will surpass the present in knowledge and education.

Photography will advance according to the increased and more critical taste of future generations, as that taste will be induced by wider knowledge and more advanced education, until it shall take its place (conceded by all) as one of the highest arts.

A more refined and higher cultivated taste, then, will demand and exact and thus call into the ranks of our profession a higher knowledge of art and a more skillful ability to work out the ideals that will comply and fulfil the demand, and so our beautiful art will progress to unknown heights of beauty and excellence.

Art education becomes necessary to every individual who hopes to be able to cater to the demands of the very near and (far more so), to the more distant future Art education ; supplemented by refined and cultivated taste, which is first God given and afterwards cultivated, will enable the votaries of photography to attain those higher achievements which we now look forward to with some certainty but have not yet attained thereto.

As the course of modern civilization tends so rapidly onward and upward that old formulæ become obsolete and old models are discovered, it may well be asked whence is to come this higher education and more correct tastes and judgment, since we cannot go back to the distant past for models and for anything more than the very first principles of art.

The answer is, a closer and more loving study of nature, nature's Creator is the highest source and indeed the only source

of perfection; so then the study of nature is the study of the works of the great and only infallible artist; there will be found all the curves of beauty, there all the true harmony of color, there the only perfection of composition, but all these beauties and perfections can only be found out by loving and patient study, only by assiduous courting can they be brought to show themselves and impress themselves on the hearts and minds and memories of their votaries; so much is this the case, that when they do yield themselves, it appears as if discoveries had been made new and valuable—discoveries that can be communicated and participated in by others—and such is art education.

The photographic art student goes to the accepted models for forms, outlines, composition; goes to the accepted canvass for the rudiments of art and artistic taste; goes to nature for the higher principles and works them out as his own inner consciousness dictates, and if that inner consciousness is a keen appreciation of beauty in form, color and contrast, improved and refined by diligent study and research, he will become a trader in art and stand in high places.

Applying his skill and taste in the practice of art portraiture, he will strive to combine unerring likeness with beauty of outlines, bold relief and harmonious shading. These are all included under two terms or headings—posing and illumination.

We exhibit our skill and taste for form and outline in posing a figure or a head. We make apparent our knowledge and appreciation of relief and shading by our method of lighting or illuminating that figure or head; by posing we obtain likeness improved by beauty of outline and graceful posture, by illumination, we obtain moderate or bold relief and harmonious coloring or shading.

By the manner in which these artistic effects are produced, the individuality of the operator will be shown more or less plainly, as he is more or less a copyist; an imitator of others—imitation of the truly beautiful and great is entirely laudable if it is not a slavish imitation. A mere copying, artistic genius, however, can never submit to be a mere copyist; genius strives to create—to strike out on new lines, to originate—and this brings us back to the true source of future progress in our art science in which we hope and believe that photography will keep well abreast with the progress in all other arts and sciences.

A HINT FOR WORKERS IN BROMIDE PAPER.

By Chas. T. Fellows.

In almost every issue of the photographic journals of the day we find some paper on the subject of "Bromide Paper." Its development with the various formulas and numerous suggestions as to the best methods of working it to the best advantage, so that the most desirable results may be obtained, and the advice on the proper way to determine the correct amount of exposure, would lead one to believe that it would be impossible to make a failure. But who can measure the exact amount of exposure necessary for each negative, when there are a number of negatives from which enlargements can be made? Probably no two of them are alike in quality, and to try a piece of paper on each would consume too much valuable time. Therefore, all one can do, after using his best judgment in making the exposure, is to depend on his skill in developing, to secure a fair average result. In some instances large doses of bromide are necessary, and then the resulting picture is anything but pleasing as a rule, with its harsh contrasts and clogged up shadows. At times even the bromide will not suffice, and the picture finds a resting place in the paper bin. In this day of low prices and cut rates everything must count. Especially sheets of bromide paper of large dimension. To lose one or more 25x30 enlargements in a day's work, means a still smaller margin of a profit already small, and it is here that I wish to suggest a means by which some of these overexposed prints may be saved. A few months ago we had a large order placed with us for 3,000 bromide prints. These were made from a 4x5 negative, on paper 6½x10 in. While filling this order we would occasionally find that some of the prints would show very peculiar marking. Some were covered with a deposit of gray fog, and others with deep yellow stains on margins, and with a green fog extending into the center of the picture in the form of gray deposit. Sometimes a whole batch would result badly, and again only six or a dozen in a batch. And at times none at all. This puzzled us; we were at a loss to understand it, and to this day we have never had it explained to our satisfaction, although we have consulted several authorities on the subject.

At any rate, out of the 3,000 prints we had about 500 that we thought we would be obliged to consign to the waste basket.

But now I must go back to October 15th, 1887. In the Philadelphia *Photographer* of that date, will be found a brief article on "A New Bleaching Process." It tells of how, in 1886, we were called upon to make some enlarged prints on plain paper for photo-engraving work. We did not possess a solar camera or an electric light plant, so we experimented on bromide paper. The object was, of course, to draw over the photograph with waterproof ink, then bleach the photo out so the picture could be reproduced in black and white. The bleaching agent used with the plain paper is bi-chloride of mercury in alcohol. We tried this on the bromide paper, but it did not do the work well. We next tried a solution of cyanide of potassium, to which had been previously added a few grains of iodine which is readily taken up by the cyanide solution. This acted like magic, clearing away all trace of the original picture, and leaving only the ink sketch on a perfectly clean white sheet. To come back to our 500 bromides:

This solution suggested itself as a means of reclaiming them. We proceeded to make up a strong solution for stock, diluting it as required for use. We selected one of the worst prints and immersed it in water until thoroughly wet. We then placed it in the bottom of a porcelain dish, and then by means of a tuft of absorbent cotton, we applied the cyanide solution to the margin of the print. When lo! "it washed it white as snow," cutting away the yellow stain, leaving not a trace of it behind. We went over the margin carefully, taking great care to avoid encroaching on the picture itself. After this we washed the print well, and then placing it back in the dish once more we covered the print for a moment with a very weak solution of the cyanide. Its action was carefully watched, and the moment the high lights cleared up it was whisked out and thrown into a tray of running water. The result was most pleasing, so much so that we treated the whole 500 in a like manner and saved 95 per cent.

Subsequently we used this method on some enlargements which were a trifle overexposed, with most excellent results. It does not in any way impair the surface or texture of the paper. Of course it must be thoroughly washed, after the operation. It is possible that some of the many workers in bromide paper may find this hint useful to them in their daily practice. But let me caution them not to use too great a proportion of the iodine in the cyanide solution. There is no necessity for measuring the

amounts. Simply add a few grains of the iodine at a time to the cyanide solution. The proper strength can be determined by testing it on any old bromide print. It is possible that this bleaching agent may be of use in many ways that will suggest themselves. We have found it so.

A PHOTOGRAPHIC PICTURE OF LIGHTS AND SHADOWS FROM EAST TO WEST AND ALL THE WORLD ROUND.

By J. A. Forrest.

My Lord Bishop of Ripon spoke as follows at Liverpool, 9th Feb., 1889 : "A man without a hobby was only half a man. I "find a man who has got one hobby was almost sure to have "two. A man's hobby was a silver thread which he could grasp "and which led him safely through the labyrinths of the world, "and it was a thing which was constantly enlarging his views "and making him something more than a narrow man who was "tied to a groove, and who became a mere machine."

The constant strain and worry of life in the present generation demands change of thought and action as relaxation, if we are to maintain a healthy mind in a healthy body. The outside world are beginning to realize this as a great truth, and no field presents greater attractions than photography. It is called the handmaid to science and art, embracing, as it does, optics, astronomy, chemistry, art, mechanism, surveying, and numerous usefulnesses.

I have been a worker in this field for half a century, and at no date during this long period have I felt its advance more encouraging than the present. Difficulties are being overcome, fog is clearing, complex processes are getting simplified and we are within a measurable distance of a new support for the sensitive film, more portable and artistic like, such as ladies may follow without drudgery or sloppy solutions, or even staining their fingers ; in short, may be worked in the field or the busy streets by the detective's camera without rude inquiries from the passing crowd, and you may bring back art treasures, landscapes, seascapes, mountain and dell with cloudland to your sanctorum to be developed at any time, as it suits your convenience, to be brought out by quinol solution into a negative that may be

multiplied a thousand fold. If the image or picture is that of a dear one that has been sent you as a gift from heaven, how precious for all time is the truthful delineation of its lineaments. Time heightens its value and leaves you to sweet reflections, hallowed by associations that the heart impressions never lose, though you wander over the vast area of the world. How constant do we hear, When did you hear from home? Even though the distance may be half the circumference of the globe. Photography writes your life's footsteps as a pictorial biography. Gems of art may be copied and made into lantern slides (the Optical Lantern is the great educator of the age in which we live). Exchanges of these beautiful scenes should be made by all photo-societies over the world; so, also, should surveys be copied and sent to friends in every clime. England is full of historic memories of the past. This new field has been already carried out, or rather suggested, by Mr. Jno. Hargraves, of Liverpool, "The Hundred of Werral Cheshire," and completed by the Birkenhead Photo. Society. His plan has been to cut out sections of a local map, each member taking a portion, photographing its objects of historic interest, then reducing the pictures to lantern slides. The result becomes valuable for all time. Already Boston U. S. A. has taken up the cue, and no doubt others will rapidly follow. What would we not give for such materials of the Elizabethan age, or "The Landing of the Fathers" in the Mayflower in America? Military photography is a field untouched. Why should we not utilize the rocket, and when it had reached its maximum of height and commenced its downward flight, its gravitation would cause it to become a parachute, the ribs of which opening would uncover *four lenses* closing them after exposure. All this would be done automatically, and on reaching the earth the "Carbutt" or other films would be taken out, paper saturated with quinol would be placed upon it and the entire field would become visible, showing the position of the beligerants. I am quite ready to show this not only to be feasible but practical. Now for a story or two of the comic side of photography. In the early part of last year an old retired gentleman accosted me with my camera and asked me who I bought my apparatus from. I replied, directing him to Mr. Atkinson, Liverpool. On making his purchase and getting a lesson of the "modus operandi" he went down to the river side, planted his camera on the edge of the pier to try

and take some ships gliding down in full sail on our noble river. (Without knowing it he placed his camera right under the electric time gun, one o'clock.) It was then within a few minutes of the time to fire, and whilst he had his head under the focussing cloth it went off and the old gentleman was blown into the river, camera along with himself. Two boatmen were close at hand; one threw a rope to him, which he grasped and was safely landed, the other boatment threw a rope with a hook and caught his camera. He gave the men a sovereign each and told them he thought the Judgment Day had come and the world was breaking up. I am happy in stating he recovered in two or three days, has since taken to a tricycle and given up the camera.

A SIMPLE DEVELOPER.

By W. G. E. Freeman.

By the earnest solicitation of the members of the Old Colony Camera Club I comply with your request to give you an article for your ANNUAL. I am one of the kind that if I have something nice (and I think I have) I like to have others know and profit by it. Methinks I can hear some say, "What, another developer!" but I would say to such, don't pass it by until you have tried it. I have used it in my studio for all kinds of work, both in and out doors (and it gives very fine results) for over three years. I experimented a long time before I got it to suit me. There are two things about it, one is, it is so simple, and the other is, it is very inexpensive, and both points are what we are all after, the first one for the amateur, because it is so simple; and the last for the professional, for what we want is the cheapest and best, as prices are so low; and if some of the readers of the ANNUAL will try it I know they will like it.

No. 1.

Saturated solution of carbonate soda.

No. 2.

Saturated solution of sulphite soda.

No. 3.

Take 1 oz	....	No. 1.
" 1 "	....	" 2.
" 12 "	....	water.

For time exposure, take enough of No. 3 to flow the plate well and to each oz. add 2 gr. of dry pyro.

For instantaneous, soak the plate in 1 dram of No. 1 and 2 oz. water, or in this proportion ; let it soak in this while you are mixing the regular developer, then pour this off and flow with developer, only have it weak in pyro. After the detail is out to suit, pyro can be added, if necessary to give more density.

Bromide can be used to advantage as a restainer for over-exposed plates.

I hope you will find some little corner in your great store house (the ANNUAL) and that some of the many readers may gain some profit from my simple developer.

ROCKLAND, MASS.

STUDY YOUR SUBJECT.

By R. M. Fuller.

There is a class of amateurs who have been induced to attempt photography by the sensational advertisements which are scattered broadcast over the country aunouncing that "any one may take a picture by using our double back action camera ; price, so and so ;" or, "Every man his own photographer ! Send for our daisy outfit ;" or, "Photography reduced to three motions," etc., etc.

Such amateurs essay "snap shots," attempt numerous photographic impossibilities, climb the hill of enthusiasm at a break-neck pace, reach the top generally at the end of the first season, and slump down the declivity on the other side, passing into oblivion, where, photographically speaking, they properly belong.

To such I have nothing to say. Like the butterfly of Summer, they have their brief day, which they doubtless enjoy after their own fashion, and disappear when the frosts of difficulty and failure at length give them to understand that "every man" cannot become a photographer, makers of cheap apparatus to the contrary notwithstanding.

To those of our fraternity who are willing to make painstaking and intelligent efforts toward success, who are fitted by temperament and education to appreciate the beautiful in nature, and are willing, step by step, to grow into that refined, artistic

perception—that perfection which gives one the right to be termed a votary of photographic art—I beg to offer a suggestion or two which may tend to remove one cause of failure in the pathway of many earnest workers.

A party of amateurs start off for a day's outing. Eager eyes note each detail of the varying landscape as they ride over the winding country road.

Now they pass through a stretch of forest where tangled vines, climbing the trunks of grand old trees, catch here and there the chance rays of the early Summer sun struggling through a canopy of leaves and branches overhead; or, perhaps they skirt along the mossy banks of a noisy brook, splashing musically over its rocky bed, reflecting here and there in some quieter pool the foliage bending lovingly towards it from either bank. Ofttimes the desire is strong to add to their collection some choice bit of foreground, or mayhap a distant view seen through a vista of the trees, but they press on until at length a halt is called and preparations for the exposure are made.

Just here, it may be, that failure in its most seductive and insidious guise is lying in wait for them.

It is my experience that *amateurs rarely study their subjects.* Whatever in nature charms the eye, or appeals to the refined and educated mind is too often deemed a fitting subject for the camera, and when the plate is developed and the print made the amateur wonders that his anticipations have not been realized.

In his disappointment he forthwith blames either the exposure, the plate, the development, or perhaps all three, because a flat, insipid picture is the only souvenir of the enchanting beauty of the spot upon which his eyes so greedily feasted.

The truth is, *failure was a foregone conclusion.* The scene was not, photographically considered, a proper subject.

It is not possible to transfix with the subtle rays of actinic light every charming bit of nature upon the sensitive surface of our plates. Strong contrasts, broad masses of light and shade are pre-eminently essential to a good negative and a successful positive.

True, your plate may be full of detail; it may be chemically perfect; but unless the shadows are massed and broad, unless the lights are concentrated and well balanced, unless the detail and half tones are subordinated to the masses, you will be unable,

however faultless your manipulation of the plate may be, to produce an artistic picture.

You will doubtless remember the celebrated receipt for potted hare, beginning, "First catch your hare." Applying the same rule to the photographic amateur, I say, before you can hope for assured success in making good pictures, you must first *learn to see pictures in nature.*

That is, you must see them *photographically.* Look not upon the landscape as it stretches out before you glowing with beauty, radiant with the thousands of tints from Nature's inimitable palette, but learn with your mind's eye to see it bereft of all its prismatic color—see it reduced to mere black and white, dependent for success entirely on the contrasts presented by its masses of light and shade in combination with the graceful outlines of its composition.

If you would attain success worth the name in the beautiful art to which we stand pledged, make it a rule, my dear fellow amateur, to *study your subject* not alone for its beauty, but critically with reference to its photographic possibilities. Divest the landscape of its glowing tints; estimate the true value of its physical and ariel perspective when reduced to a plane, and in every way judge the fitness thereof from a photographic rather than a purely artistic standpoint.

Do not be discouraged if you fail to attain success on this line after a few trials. Failures are not altogether useless, though they are annoying and discouraging. After carefully considering your subject as I have suggested—and the result is more or less of a failure—*study your picture* with the view of ascertaining the *cause* of failure, and so prepare yourself to avoid its repetition.

The amateur photographer who enters enthusiastically into the spirit of his work does well: but he who couples with enthusiasm, intelligent and studious application and familiarizes himself with the fundamental principles of true art does better.

A DETAILED STATEMENT OF HOW TO UTILIZE OLD TONING BATHS.

By J. B. Gardner.

First slightly acidify the bath with either muriatic or sulphuric acid, for if left alkaline there will be more iron than gold

precipitated. Second, make a saturated solution of photo-sulphate of iron, filter it, and add one ounce of this to every sixteen ounces of the bath. When the gold has been thus thrown down, collect the deposit on a filter and thoroughly dry it. To each ounce of this add four ounces of muriatic acid and two of nitric, and when dissolved evaporate until it is nearly dry; then add about the same quantity of water that was originally used of the aqua-regia, and evaporate again to about the same point as at first. Now pour the mass into a quantity of water in the ratio of fifteen ounces of water to each ounce of aquaregia that was used as the solvent. Filter and add the saturated solution of iron in the ratio of one part to fifteen parts of the gold solution. It now requires to stand until thoroughly settled, then decant carefully into another dish, and wash the deposit in several waters, allowing ample time after each washing for the gold to settle. After the third washing take a small quantity of the water and add to it a drop or more of ammonia. If there is no deposit and the water remains colorless, the washing may be considered sufficient for all practical purposes. If, however, iron be detected by this test, or should it be noticeable in the form of sediment with the gold, it is well to wash in acetic acid and then again with water until the last trace of acid has disappeared. While this washing is being effected the liquid first decanted should be treated again with iron, and if there is no further deposit after standing for several hours it may be taken for granted that there is no more gold in the solution. If, however, water be added, sufficient to neutralize the acid, it may throw down a deposit of iron. Hence, in separating the gold, it is always essential to keep the solution sufficiently acid to prevent the iron from precipitating. If too acid, however, which may happen when the evaporation has not been carried far enough, there will be little if any deposit in the amount of time really requisite in separating the gold from a solution that has the proper acidity. I should have stated that when the mass is taken from the evaporating dish there will be a deposit of chloride of silver as soon as united with the water. This, of course, is not to be kept with the solution that is to be treated with iron, but disposed of in the manner usual to all photographers who take the trouble of saving all the waste silver solutions. When the gold has been dried, as above described, it is in a pure metal state, and can be readily dissolved in aqua-regia, one ounce of which will be found quite sufficient to dissolve

a drachm of gold. It now requires to be evaporated until the acids have nearly disappeared, and then add to it the same amount of salt that there is of metal gold, dissolved in the same quantity of water as was required of aquaregia. When this has been evaporated to about the same consistency as the first, add water sufficient to enable you to filter without difficulty, and dilute this again as required for use. One grain of the metal thus treated will saturate two ounces of water sufficiently to tone with, though it may be used stronger if thought expedient.

HYDROQUINONE AND ITS ASSOCIATES IN DEVELOPMENT.

By W. Hanson.

Regarded in its technical aspect photography seems to be an almost unique art, for besides its mechanical manipulations it has chemical and physical processes which only require to be started and guided by intelligence in order to make them bring about the end proposed; hence the reason for the experimental examination of any alleged improvement of, or addition to its several processes, lest a new power should be passed over by neglect and an unconscious falling behind in the race of technical excellence result as a consequence. Not that an artistic photograph is to be reckoned as the outcome of a mere process, far from it; but since processes are necessary to the production of photographs, it behooves a photographer to make sure that he is in possession of all the known resources of his art; so that while constantly aiming at the full realization of his highest conception of artistic work, he may still keep up to the very best standards of technical excellence, for of these even the general public are good judges.

The latest chemical addition to the photographic dark room is hydroquinone and so far as a brief experience of its use goes, I think it may honestly be said of this comparatively new developing agent that it deserves all the praise that has of late been given to it, and moreover that to the first experimenter with it (Capt. Abney, I believe) photographers are much indebted for the new power he has unquestionably been the means of putting into their hands, and still further that there remains a debt of grateful acknowledgment due to those more recent experimentors

who have freely published good working formulæ for the use of all. Personally I have found much useful information in both the first volume of the INTERNATIONAL ANNUAL and the *British Journal of Photography*, relating to the use of this new developing agent.

The necessary associates of hydroquinone seem to be alkalies and sulphites, and when the respective functions of these are understood, as acceleraters and restrainers, it is self-evident that numerous changes may be rung by varying their proportions in relation to the hydroquinone as well as to each other; and again if the alkalies, for the sake of simplicity, be divided into two classes, the strong and the weak, placing the caustic in the first and the carbonate in the second, owing to the now well-known retarding power of carbonic acid, it will be seen that another series of modifications are possible; and still further, as the tendency of the first class is to produce greater density of the developed image, a third series of important modifications is obviously practicable by a mixture of the two classes of alkalies; in short, by duly attending to the conditions of light, exposure, temperature, nature of plate, etc., almost any modification of developmental action may be effected in these ways—as to time, differing from two minutes to as many hours—as to character, of the developed image, varying from the faintest stain to perfect opacity of the high lights.

The formula ascribed to Dr. Piffard, is, I think, a fair representative of the weak or carbonate series, and "a new formula" advertised by R. W. Thomas & Co., Ltd., may be quoted as a type of the strong or caustic series.

The former runs thus: Hydroquinone, 100 grains; potassium carbonate, 300 grains; sodium sulphite (cryst.) 400 grains; water, 20 ounces, one solution.

The latter as follows:

"Take Hydroquinone	160 grains.
" Sodium sulphite	2 ounces.
" Citric acid	60 grains.
" Potassium bromide	30 grains.
" Water, etc	20 ounces.
Take Sodium hydrate	160 grains.
" Water, etc.	20 ounces.

Use equal parts of each solution."

Touching the use of bromides with hydroquinone the prevailing

opinion seems to be that they are unnecessary, but this notion may perhaps undergo alteration as the action of soluble bromides when associated with the fixed alkalies or their carbonate comes to be better understood by the teaching of experience. In the meantime we know that it is not all the same whether we add bromide of potassium or bromide of ammonium to restrain a developer which contains a fixed alkali, either in the caustic or carbonate form, for the latter haloid would immediately effect an alteration in the constitution of the development by starting changes which would result in ammonia being set free, and so destroy the balance of the developer, and moreover, what is of greater practical importance, under some conditions, act *indirectly* as an accelerater instead of, *directly* as a restainer, for the reason perhaps that ammonia is a more potent agent than the *carbonates* of the fixed alkalies which are curbed by the restraining power of the carbonic acid to which they are united.

I ventured to make this statement in the *British Journal of Photography*, 19th October last; it was challenged in a leading article shortly after. However, I have since then read an instructive article on "Action of Soluble Bromides on the Latent Image," by Dr. Hill Norris, in this year's *British Journal Photographic Almanac*, which, to say the least, is not opposed in its teaching to what I then advanced and now again repeat, because it conclusively shows that "potassium bromide" is far from destroying any part of the latent image, for it is alleged to have caused more delicate details to be brought out in the experiment accorded than were obtained without it.

I offer these few remarks as an apology for the recommendation of so large a proportion of bromide as that given in the following formula, lest it should be taken for a misprint:

Sulphite of soda (cryst.)	32 grains.
Bromide of potassium	32 grains.
Hydroquinone	8 grains.

Dissolved in one ounce of pure water.

Caustic soda	8 grains,
Water (pure)	1 ounce.

Use equal parts of each. Solution for normal exposures.

I have produced negatives with this developer which reminds me more of the best class of wet plate work done years ago than anything I have before seen on dry plates.

REDUCTION OF NEGATIVES.

By F. J. Harrison.

A perfect negative is the exception rather than the rule. Even though the lighting and pose be accurate and the subject perfectly tractable, there is often something either in the exposure or in the development or in both, which necessitates a doctoring up of the negative before the print obtained from it can be considered successful. The development may, perhaps, have been carried too far, a large quantity of silver has been deposited and a hard unartistic picture is the result of our labor. The contrast between the high lights and the shadows is then too great, the half tones being barely discernible.

This may be remedied to a large extent by *reducing* the thickness, and, therefore, the capacity of this too dense film of silver. To effect this either chemical or mechanical methods may be resorted to. Of these the former is greatly to be preferred; reduction by mechanical means being adopted in cases where *parts only* of the negative require to be diminished in thickness.

Chemical Methods.—In this case either some less opaque material is substituted for the silver, or this latter is partially converted into soluble compounds and these removed by suitable solvents.

Among the former class may be mentioned reduction by immersion in mercuric chloride. The plate is first well soaked in water and rubbed lightly with the finger, care being taken to remove any grease spots or the like, which frequent handling may have produced. It is then immersed in a weak solution of mercuric chloride, and, after the requisite interval, well washed. The film is bleached white, the silver being replaced by a mixture of silver chloride and calomel, according to the equation:

$$Ag_2 + 2HgCl_2 = 2AgCl + Hg_2Cl_2.$$

This method, although really increasing the thickness of the film, diminishes largely its opacity, the black opaque silver giving place to the more or less translucent mixture of the two chlorides.

A much better method of reduction is that effected by the *actual removal* of part of the silver. Most clearing solutions reduce the density by dissolving away a fraction of the image. Thus HCl or HNO_3 mixed with from seven to eight times their

bulk of water will slightly reduce a negative. Care must be taken, however, to prevent frilling.

The silver forming the image is usually partially converted into chloride by weak solutions of ferric chloride, copper chloride, chloride of lime, sodic hypochlorite or similar solutions, the silver chloride being then removed by some solvent.

These substances have an oxidizing action, yielding up part of their chlorine to the silver, being themselves reduced. Thus, in the case of chloride of iron part of its chlorine combines with the silver of the image to form silver chloride, the ferric chloride being reduced to ferrous chloride

$$Ag_2 + \underset{\text{Ferric chloride.}}{Fe_2Cl_6} = \underset{\text{Silver chloride.}}{2AgCl} + \underset{\text{Ferrous chloride.}}{2FeCl_2}$$

With copper chloride the action is similar :

$$\underset{\text{Cupric chloride.}}{2\ CuCl_2} + Ag_2 = 2AgCl + \underset{\text{Cuprous chloride.}}{Cu_2Cl_2}$$

It is usually mixed with common salt, which dissolves the silver chloride as it is formed.

One of the best methods of reduction is that advocated by Farmer, being the conversion of part of the silver into Ferrocyanide of silver and the removal of this by Hypo. The soaked plate is placed in a weak solution of potassium ferricyanide, potassic ferrocyanide and a similar compound with silver are formed

$$2K_6Fe_2Cy_{12} + 2Ag_2 = Ag_4FeCy_6 + 3K_4FeCy_6$$

The ferricyanide solution employed must be *fresh,* as it undergoes decomposition when kept. The action takes place very rapidly and must be carefully watched, the dish being rocked continually. The plate must then be well washed. This method may, with due caution, be used for local reduction ; the solution is applied with a camel-hair brush, the plate being well washed at each application.

Beach recommends soaking the plate well in water and then treating with chloride of gold. Wash well and treat with potassic cyanide. In this case reduction takes place slowly, but the method is hardly one which commends itself to the general photographer.

By Dr. Eder's method, the desired reduction is obtained by converting part of the silver into chloride, iodide, and cyanide by

mercuric chloride, potassic cyanide and potassic iodide, and the removal of these silver compounds by excess of potassic cyanide. Of all the above methods reduction by potassic ferricyanide is the one to be preferred for general use.

Mechanical Methods.—These consist in reducing the density of the negative by rubbing away part of the film. A pad of cotton wool dipped in methylated spirits is employed and the film carefully, but firmly, rubbed down to the required thickness.

In certain cases very fine local reduction becomes necessary, *e.g.*, the development of detail in the hair of a portrait. This is best effected by carefully drying the plate and then gently *scraping* with a mezzo-tint scraper, care being taken that the gelatine is not softened by the moist breath of the operator.

PHOTOGRAPHY AS A LECTURE-SUBJECT.

By Chas. Harris, M. A. Oxon.

I have found that lectures on photography are usually much appreciated, and there is really no reason why this subject should not be made as interesting, even to a non-professional audience, as any other of a scientific or quasi-scientific nature. My own practice is to devote the greater part of the time, say forty-five minutes, to history and demonstration, and then to occupy the last half hour with limelight illustrations on the screen. The historical portion, should, I think, be cut as short as possible, the merest outline being given.

Fabricius, Scheele, Nicéphore Nièpce, and Daguerre, may be dismissed with a word or two. Talbotype is more important, and should be dwelt on a little longer. While the substitution of collodionized glass for paper, and subsequently of gelatine for collodion as a vehicle, brings us down to recent times. Actinism may be briefly dealt with, and the properties of silver salts specially emphasized, the chloride, bromide, and iodide being made and shown. Sensitiveness may be indicated by the darkening of prepared paper by burning a few inches of magnesium wire. Practical illustrations of the method of making the exposure may be given, and plates passed round for examination in the three stages, undeveloped, developed and fixed.

Proceeding then to printing processes, the one which lends itself best to demonstration is undoubtedly Platinotype; and I have

always found this extremely effective; the prints may be handed round immediately after development. A passing reference to portraiture, photogravure and celestial photography will be as much as time will admit of; and the gas being lowered, the limelight illustrations are at once proceeded with. A negative, with its corresponding positive is very effective, especially when one is dissolved into the other on the screen. I think a portrait answers best. The fixation of a lantern transparency may follow. This is performed in a glass tank, filled with the fixing solution the very last thing before placing it in position in the lantern. Actual development on the screen is possible, but I do not recommend it; for an ordinary audience whatever is most effective is always best, and there is no doubt about the fixation being the more effective of the two. Of course it must be understood that in this sketch I am alluding to popular lectures, in which elaboration of technical details would be out of place.

A most ludicrous effect is produced by putting a portrait transparency in *wet;* the warmth of the lantern soon causes the gelatine to run, and the features gradually assume an aspect which must be seen to be appreciated; in fact, if the portrait be judiciously chosen, and the original well known to the audience, this never fails to create a sensation; but great care must be taken to select something which cannot give offense. The transparency must, of course, be a gelatine plate, and guiltless of any association with the alum bath, which would harden it.

Instantaneous photography may be illustrated by Mr. Muybridge's photographs of animals in motion, which make good lantern slides; also by transparencies showing the electric spark, and flashes of lightning. Examples may also be given of balloon, stellar, and microphotography, and of many other subjects which will occur to the lecturer; while a few views of local scenery, with a portrait of the chairman or some local magnate, will form an appropriate finale.

"ART SCIENCE."

By J. H. E. J. Harris.

Who invented the form, "Art Science?" Where did the designation originate? From what profound store of erudition was this complex designation evolved? And being invented or evolved, who evinced another eccentricity of genius and applied

the hybrid term to a photograph? Opinions differ, even in this advanced age; some assert the photograph, a work of art, others with equal pertinacity deny the name of art to a picture produced by agency of the camera. And yet another section of the community exists which would reduce picture-making by photography to a mere question of pyro or quinol, of 22¼, or how many ounces a camera ought to weigh.

The intention in the mind of the photographer is, or should be, "to produce a beautiful result, to embody in visible form the delight its author feels in certain thoughts and certain facts of nature and humanity." But if this aim has been achieved in the mono-chrome, the result is a work of art. "How it's done is chiefly interesting in relation to conjuring tricks." And on "How it's done" is the rock on which so many well-meaning workers come to grief. Take the photographic literature at hazard; here is a copy bearing the date of March 15th. The essence of the meetings of various societies thus resolves itself. If quinol be mixed fifteen minutes before using, it works to greater advantage than if employed at once, perhaps pyro gives a better printing negative. Much may depend on the plates used, under certain conditions stains may ensue, perhaps owing to inexperience. Should we focus after stopping down? Will hypo reduce a gelatine negative? What is the most desirable camera for a lady to use? And how to develop without washing. It may be suggested by the "Art Scientists" that these questions or discussions relate to the scientific aspect of photography, and that until these preliminary details have been settled, the "latent image" cannot be brought to view in a satisfactory manner. But if there be any art in photography, it is subject for earnest consideration whether more attention should not be paid to the "latent image" itself than to the means whereby that image is to be made visible. From a pecuniary point it may be of intense interest that a multitude of "latent images" be brought forth out of the same lot, but from an artistic standpoint "How it's done" matters not one jot.

It should be distinctly remembered that scientific acquirements will not enable their possessors to produce a work of art. Rather the reverse, as the tendency will not be in the case of great technical knowledge to make parade of it; the work will bear on its face the mark of the beast, the "reason why" it was produced. The intention, aim, object of the photographer

is to "embody in visible form certain thoughts and certain facts of nature and humanity." Where is the science in this? The subject relates purely to art, and if the photographer cannot herein express his sympathy, better had he adorned another vocation during his sojourn in this vale below.

"You may teach a man to draw correctly with more or less difficulty, and you can even teach him to paint correctly, up to a certain point, *but the secrets of beauty in color and form* you can by no *means teach him, though if he be humble enough to work single mindedly, he may in time come to understand them, at all events sufficiently to recognize their presence.*" These secrets of beauty are developed by the power which *drawing* gives; they spring from the cultured taste of that sympathetic soul who is privileged to write himself—artist.

The delineating of beautiful form is an art, not a science. Composition, and the skill of concealing the art composition by beauty and firmness of outline and by wealth of sentiment, has not yet been considered by any reliable authority as one of the sciences, no matter whether that composition be expressed in one color or in many. A composition *can* exist in a photograph. Where is the "Art Science" (!) of it? Perhaps, after all, it finds a haven in the fervid imagination of that struggling genius, bursting its bonds in the search after fame, where it arranges, say, a figure from the life, and after the antique, of course. The "pose" is photographed. Photography has the luck to come in for a large share of this species of "composition." The negative is printed and after profound study and reflection as to what the object looks most like, a name is given unto it—unto art a picture has been born! No such thing. This is not art, not even science; nothing but a photograph, a mechanical representation of a model "as it was." Art rests only upon those qualities which are at once of universal and eternal appeal, beauty of color and line, intensity of emotion, essential truth of feeling or of fact."

SILVER STAINING: ITS PREVENTION AND CURE.

By Lindsay Hemery.

Silver staining is especially the amateur's besetting sin, but the professional, too, looking on a valuable negative hopelessly

marred by its ravages, often has cause to lament his imprudence or carelessness that has subjected him to the price of such penalty. Thus, though I have in my mind principally my experience of amateur troubles in this respect, I feel sure that most professionals will find a decided interest in my subject, whatever be their estimate of my opinions and suggestions. Our esteemed editor's invitation for a contribution coming just at the winter of our discontent in this regard, while for several months past I have been receiving negatives in various stages of the disease, with requests to "dodge them," I gladly take this opportunity of expressing myself.

A brief analysis of the origin and nature of "silver staining" may here be given. It is one of the ills that gelatine plates are heir to. Gelatine is a hygroscopic compound, that is, readily absorbing and retaining moisture. On the other hand the sensitized albuminized paper contains a certain amount of free nitrate of silver. This, when in contact with moistened gelatine, is readily absorbed by the latter and a "gelatinate of silver" is formed. This last combination is sensitive to light, and under its action assumes the orange color of the well-known "silver-stain." Now, orange being a non-actinic color, these spots or stains print white on the positive picture. Thus, it is seen that damp or moisture is the origin whence originates the whole train of baneful influences. Thus it is that silver staining principally shows at the edges and in the center of the plates, the moisture creeping in at the openings and through the joints of the printing frames. There is also a more violent form of the disease where rain has penetrated the frame, and large masses of stain result. In all instances, of course, the disease is most palpable where the gelatine film is unprotected by any medium between it and the sensitized paper.

Varnishing is a very great protection, but as ordinarily done, is not an absolute preventative. The gum varnishes generally used are more or less pervious, and should rain enter the frame, staining is sure to result. Or in foggy weather, when printing occupies a period of days, the film will become attacked.

Let us consider the more perfect means of "prevention." The first step is "never omit the alum bath *after* fixing." Alum closes and tightens the film and is a great point in "prevention." After being thoroughly dried, the negative (without heating) should be coated with collodion. If retouching is required, it

should be done at this stage, the collodion with a little medium giving an excellent surface for the pencil. The negative should now be varnished in the ordinary way, and this completes the treatment, which should always be adopted by careful operators with negatives of any value. An excellent, though somewhat disused, procedure is the insertion of mica (or plates of talc) between the negative and paper. These plates, though somewhat expensive in the first instance, may be used repeatedly, and should be largely employed by amateurs when taking their own proofs, as with amateurs, varnishing is generally a *bête noir*. The employment of rubber pads, sometimes recommended, is a mixed blessing, as unless the paper be thoroughly dry, the damp has no escape except into the gelatine film itself. When waterproof sheets are used a sheet of well dried blotting paper should always be placed between them and the sensitive paper.

When these precautions are carried out silver staining, in any ordinary form, will never occur. But, unfortunately, most amateurs and some professionals are too impatient to think of such methodical procedure and anxiety to "see how it prints" overrules all prudence and discounts the most elementary precautions.

Thus we approach the more difficult branch of our subject, the section of "cure." We will first consider the case of a negative "spotted" in the most usual way. It has been stated that soaking in alcohol will remove these spots, if slight in character. I believe that with the help of a little friction from a plug of cotton wool, the treatment is available in exceedingly "slight" cases. But the majority of such cases may be successfully treated with cyanide of potassium. The plate should be alumed before and after the operation; and it must be remembered that the effect of cyanide is to reduce the film generally, and therefore its progress should be carefully watched. Larger patches of stain, if taken early, will yield to like measures; but where the stains have been long existent, cyanide would not remove them short of destroying the whole image. In such cases the treatment may be carried as far as may safely be done, and the "cure" completed by retouching.

Retouching may be largely utilized for doctoring a silver-stained negative, though specially acquired skill may be demanded for a successful result. Landscapes lend themselves most easily to this treatment.

Thus should the stain be principally on the sky, evidently the blocking out of that portion and the subsequent printing-in of a combination cloud is required. In portions of foliage the spots may be pierced by a needle point. And in very dark shadows the stained portions of film may be entirely removed by a knife; a wash of color to match the surrounding tint being substituted. Again, where the stain has been only partially removed by the cyanide treatment, scraping with the knife may further reduce it; or the surrounding parts by brush and pencil may be lead up to it.

At one of the exhibitions I saw a military picture where silver staining had occurred all over the foreground (a light roadway). A little retouching would at once have given this stain the appearance of a cloud of dust rising from the ground. Sometime ago, also, I had a badly stained negative sent to me, which by the requisite retouching I improvised into a snow scene. It was adopting an extremity, but desperate diseases require desperate remedies.

Where, as will sometimes happen, a proof is required immediately after the negative is made, the plate should be flooded with alcohol and afterwards held by the fire for a moment. Behind the silver paper should be placed a well dried pad of felt, and the frame should be placed out for printing on a dry sheet of metal.

So much for the "prevention and cure of silver staining." Certes, in this instance "prevention is better than cure;" in other words, "more haste, less speed."

SCRAPS.

By Thomas Entrekin Hibben.

It is not "the books which have helped me" that I seek in hour of need, but the books to which I have helped myself, my scrapbooks, next the camera, the most precious of my possessions. A pair of bond shears, a book with ready prepared leaves, a supply of current photographic literature and a wet finger, are the essentials, to which time, patience and application are accessory.

I have occasionally been able to purchase back numbers of photographic periodicals and the English annuals at a rare

discount for lots "to close," and have been amply repaid for careful reading, by the increased bulk of my scissors edited book.

My experience has been that when an amateur is at loss for some method of procedure in photographic processes, it is at a time when he does not desire to ask, say Sunday, he is isolated from his library, or it is the dead hour of the night when nothing can be had, not even advice. Personally, when I have wanted to know anything, it has always been with a "want" which was mortal to the undertaking, unless satisfied forthwith.

It is ordinarily an advanced type of disease that afflicts the amateur photographic ventures, and the remedy, to be of avail, must be applied promptly and surely. With a pet plate strangling in his sight, he does not have time to wade through pages of "Price War in Jimtown," whole chapters of "Professional *versus* Amateur," or columns of algebraic formulæ relative to—well, say "Spectroscopic Photography," but wants the antidote, if any, for his technical ignorance under eye and hand.

As you peer anxiously into the developing solution and note the feeble results of an afternoon's work, how often comes the thought: "There is a way out of this; I have seen it somewhere." There is pleasure in turning the tide of battle between wrong exposure and correct time in your favor, by copious solutions of intelligent scraps. The most willful of dry plates has been known to succumb to "scrapbook" vigorously applied. The hundred and one recent valuable wrinkles, dodges and kinks that float through the photographic press, may be gummed fast to your memory; the merely mechanical operations of cutting and pasting, tend to fix in your mind the whereabouts of the articles so clipped as well as their bearing on the art.

My scrapbook is broadly divided into facts relating to the camera, to indoor and outdoor operations, to plate makers' formulæ, to miscellaneous processes with an especial "department" for lantern slides and "fake" work of all kinds. It includes tables of all sorts, from all sources, not very methodical, but in such shape that ordinary care will suffice in making up.

There are a few words of my own; but, strange as it may seem, nothing respecting "photography in three motions," even my pyro-stained scrapbook repudiates the ready-aim-fire-and-

fall-back machine photography exemplified by that sole leather apology for stealing another's brains called the "Kodak." The very nature of the book is foreign to such drop-an-eagle-in-the-slot affairs, for those who think with their pocketbooks.

ARTISTIC EDUCATION OF THE EYE.

By E. K. Hough, Fredonia, N. Y.

When we speak of educating the eye, we mean, of course, those faculties of the mind that receive impressions of the outward world mainly through that wonderful organ.

We speak of "an Eye for color" and "an Ear for music," as if they differed from common ears and eyes, when, in truth, it is the artistic and musical faculties using those organs that make all the difference.

Every form of art which represents objects and scenes in nature, by imitating on plane surfaces their effects of light and shade with color or without, cannot be understood by any of the senses but that of sight.

Other senses may receive partial impressions of other art work, such as carvings and statues, but no person can receive intelligent impressions of drawings or paintings except through the eyes, and seeing them, can have no full understanding of them, unless the eyes are educated to see correctly.

Eyes, when awake, are always seeing; they are open, and the light enters without effort, conveying impressions of form and color continually; but what a vast difference in the kind of seeing done.

The speculator sees chances of making money, and the spendthrift of squandering it; the egotist sees chances of gratifying his pride, and the sensualist his passions.

The same eyes dwelling on the same objects, receive such diverse impressions according to the faculties which are awake and active, looking out upon the world from those "windows of the soul."

The artist eye sees pictures everywhere.

A person with untrained eyes may walk along a winding path, by a gentle stream, through a beautiful landscape and see nothing but green trees and running water, where the educated artist eye would see a thousand forms of grace and beauty,

while every turn of the path would open to his appreciative gaze a new picture, painted in light, and always colored in harmony.

To know what constitutes a picture is one of the first requisites of art, and to be able to see it wherever it may appear in nature is one of the first lessons in the education of the eye.

The educated eye sees pictures separated from their irrelevant surroundings and set, as it were, upon a mental canvas, clear and complete in themselves, always telling some story or giving some lesson, exciting some emotion or gratifying some sentiment.

And this power of seeing pictures must precede the power of producing them.

Every true picture is first conceived in the artist mind before it can be rendered visible on canvas, or even in a photograph.

No real picture was ever taken photographically without previous conception and design any more than painted so.

Of course a painter might spread his colors on canvas hap hazard and then, detecting some resemblance to nature, give it a name accordingly; and a photographer by shooting to right and left promiscuously may get effects that he styles pictures, yet few pictures, worthy of the name, will ever thus be made either way.

Always the educated eye first sees the possible picture, and then the trained hand works out or arranges for the valuable result by brush or camera.

And, now when photography is taking a hand in almost every form of art, and when interested parties seek to inspire a belief that any one can learn it in a short time with but little trouble, it is perhaps well to emphasize some of its special difficulties under this education of the eye, and thus impress upon those who rush in with shouts of triumph asserting they have learned all that is necessary to know, and even claim to take precedence of those who have given years to educate their artistic sight that, although they may have read all the books, and committed to memory all the formulas, and even acquired skill in all the manipulations, still they are far from the artistic summit if they have not attained that education of the eye which is necessary for putting it all into efficient practice for valuable results.

As nine out of ten who get their living by the art are portrait photographers, we will speak more along that line at this time.

There are five points in portrait photography, which, like the "five points of fellowship" in Masonry, the entering neophyte must learn before he can be a full fledged member of the craft.

These five points in photography are :

First.—The artistic education of the eye and its attendant faculties, to know what a good portrait photograph is; what rank it holds among other methods of artistic representation; something of its possibilities and limitations, that no time be wasted trying for effects unsuited to it; and most important, how its possibilities can be controlled and guided in accord with the general rules that govern more or less all forms of art.

Second.—To so educate the eye that it can see the lights and shadows on the face as distinct from and independent of its color, when seeking to properly represent its forms and features.

This education would largely avoid those constantly recurring and perplexing failures that give so much cause to wonder why beautiful faces full of harmonious color, and giving brilliant and charming images on the ground glass of the camera, yet give such inadequate and disappointing results in the finished photograph.

This education is as necessary as any formula in the chemical reactions, yet no formula can embody or convey it, only long and patient training can enable him to see all the varying shades as they play over the face, bringing out or subduing its forms, giving vigor and strength, or delicacy and grace, as he may desire.

And as his educated eye grows more and more skillful he sees shadow within shadow showing little variations of form, where he only saw one surface before, and he sees a meaning and purpose in them all that he never had fully comprehended.

Now when a person or face is presented for a portrait, he sees the possible picture he can obtain, and when he arranges the lights and shadows, works for a definite purpose, with a large degree of certainty as to the result.

Third.—To so train and educate the eye that it can see in the natural objects presented for a picture, whether portrait or landscape, the widely varying effects that the translation from their many colors into the one color of photography will cause in the result, especially in the masses of light and dark, upon the

proper distribution of which the balance and harmony of every picture so much depends.

Every photographer knows how often humiliating disappointment in the effect is possible, if this point is forgotten or not comprehended.

Fourth.—To judge with constant discrimination how much *less strong* in contrast the lights and shadows must be arranged upon the face, to give, in the finished picture, effects equally as pleasing as those seen by the eye in ordinary light.

Artists who learn to arrange lights and shadows on the face for a portrait, just as they wish to represent them, always get very disappointing results when they first try to arrange in the same way for effects by photography. They find that it requires a special education of the eye to judge how much they must modify in making allowance for the exaggerations of photography.

And we all see often in albums so-called Rembrandt pictures, absolutely repulsive, with their harsh and grimy shadows. which doubtless appeared all right to the one who took the pictures when he arranged them on the ground glass, and he probably blamed the art of photography for the disappointing result, which he knew no way to avoid.

His eye was never properly educated to make the needed allowance and variation them or he would never have so taken nor to know what constitutes a good picture or he would never have so delivered them. Thus he goes on making "effective" portraits in self-complacent ignorance of first principles.

Fifth.—And last, though not least, after the negative has been secured, with all the good points as desired, it requires another special education of the eye to judge with accuracy, how much over printing the picture needs in each case to secure the best effects the negative can give, and all photographers know by costly experience that it requires years of constant practice for their assistants to become proficient in any one of these five special requirements, and that it is rare indeed to find any one, even after a lifetime of study and application, who has mastered them all.

Is it not well then to hold up a finger of caution to those who are rushing into the portals of the temple with so little comprehension of the difficulties they must encounter and the laborious discipline they must undergo before they can be initiated into all its mysteries?

Yet as many blossoms give greater promise of some fruit, and of many seekers some shall find, so from all this photographic activity great general improvement must come; although there will be much individual disappointment among those who are led to believe they can buy all of photography in books, or learn it all in formulas.

I have therefore tried to indicate some of the points where the personal equation must come in to solve the problem, before any considerable success can be achieved.

"WHAT SHALL I TAKE?"

By Frank H. Howe.

How often I hear the remark, "What shall I take?" Generally it comes from some amateur having plenty of enthusiasm, but no artistic taste. In the most picturesque of places, with choice bits all about him, he would still say, "What shall I take?" His case is a hard one, but if the enthusiasm can be kept alive, the artistic faculty may be acquired to a certain extent. To all such amateurs and also to the artistic amateur, we would say: Make your art useful.

He who takes pictures solely for his own gratification and that of his immediate friends will find sooner or later that the pleasures of photography will pall upon him.

While listening to a lecture on the Ancient Earthworks of Ohio, illustrated by stereopticon, the lecturer (Prof. Putnam, of the Peabody Museum of Archæology and Paleontology), made the statement that the pictures had been made by an amateur. At once it was suggested to me that here was a field for that class of amateurs who have the leisure and inclination to make the art science something more than a means of personal gratification; a field in which they could enjoy all the pleasures of photography, while making their work useful to themselves and others through its educational influences, and promote the cause of science for which photography has been and continues to be of such inestimable value.

The works of that comparatively unknown race, called the Mound Builders, are found along the line of the Gulf of Mexico, on the northern and southern shores of Lake Superior; they occur in great numbers in Ohio, Kentucky, Indiana, Illinois,

Tennessee, Missouri, Wisconsin, Arkansas, Texas, Louisiana, Mississippi, Alabama, Georgia and Florida. They are found in lesser numbers in North and South Carolina, western parts of New York, Pennsylvania, Virginia, Michigan, Iowa, and a portion of the Mexican Territory. These works are in many places gradually disappearing, their location and conformation is a matter of much importance to archæologists, and through them, to the world at large. Their importance may be judged by the fact that a large proportion of the publications of the Smithsonian Institute at Washington have been devoted to this subject.

It is very desirable that these earthworks be photographed; the scientific institutions making a study of such subjects can do but a very small part of this work, and that only of those best known. Let those amateurs residing near such works who want to know "What to take?" make negatives of them, taking care to include surrounding landmarks. Then send a mounted print to the nearest archæological or historical society, giving on the back of the mount all the data they have been able to gather.

A large proportion of our amateurs, however, are in the New England and Eastern States where these earthworks are not found. Very true; but they are on historic ground. In or near most every city and village are historic objects, fast disappearing before the needs of advancing civilization and the ravages of time. Take, for instance, New York city, Boston or Philadelphia. How much of value and interest could have been preserved, if one hundred, or to come within the era of photography, fifty years ago, a few "snap shots" had been made here and there on objects of then comparatively little historic value?

Take a city like New Haven, Conn., with which I am familiar, and rich in historic associations. A few years ago the house in which Benedict Arnold lived was destroyed. Is there a photograph of it? The home of Noah Webster, where the dictionary was written, is still standing and in good condition, but a photograph of the house and the room in which that great work was written would be of very great interest and value to any historical society.

The Judge's Cave, where the regicides, Goff, Whalley and

Dixwell took refuge from the pursuit of the soldiers of the King, has changed much within the recollection of persons now living.

A great variety of subjects suggest themselves in a city like New Haven, in fact several albums of very great historic interest and value could be made. It is true a great many negatives have been made of these places, but they are scattered one here and one there, and likely to be destroyed, while if prints were made and forwarded to the nearest historical society, they would gladly care for them and preserve them to future generations. What is true of New Haven is true to a greater or less degree of almost every city. What a valuable and interesting addition to a photographic club room would be an album made up of such pictures as I have suggested; but that others may be benefited, duplicates of the prints should be sent to historical societies, where they will be accessible to the general public.

What I have stated is merely in the way of suggestion; any one who will give the subject a little consideration, can readily see that it opens up a large field for useful work. The cost ought not be a consideration to any amateur who cares anything for his art, and the pleasure of having done ever so little for the general benefit of your kind, is no mean reward. By all means, take the credit justly due you and inscribe your name in a conspicuous place on the mounts.

THE USE OF CLOUD NEGATIVES.

By Gustine L. Hurd.

It is, perhaps, hard to tell whether photography has made more progress toward art value in portraiture or landscape work. In either direction examples of marked artistic excellence are not common. We see many striking effects, and much technical excellence, but pictures are rare. It is not my purpose here to enter upon any discussion beyond a thought or two concerning the use of cloud negatives in the production of out-of-door pictures. The attempt to take a landscape almost always results in an overdone sky, and the practice has become quite

common of printing in a sky from a separate negative. This method of introducing clouds into a picture is not to be condemned were it not done, in a majority of cases, in such a way as to "make the judicious grieve." With many, nay more, photographers, a cloud negative is a cloud negative, and the same negative is used through thick and thin, in connection with all sorts of subjects and every variety of lighting. It is not at all uncommon to see the clouds lighted directly the reverse from the landscape into which they are printed. Negatives with heavy masses of clouds, it seems to be thought, are the only ones worth using, and into the most unoffending scenes, they are printed with a ruthless hand. A moment's thought should convince any one who has a glimmering of the science of picture-making, that clouds should be introduced into a landscape with as much care and selection as an accessory into an interior. Clouds should always supplement a landscape and be subordinated to the general effect—like the clothes of a well-dressed person, which adds grace and dignity without being noticeable themselves.

Rules can hardly be given, but this much may be said: Do not make your picture topheavy with clouds. The sentiment of the clouds employed should be in tune with the scene into which they are introduced; as, for instance, dark masses of hurrying clouds do not accord with a quiet, smiling landscape. A suggestion of light, fleecy clouds is all that is required in many cases. A rugged scene where broad masses of shadow appear, will sometimes suggest heavy clouds to complete the effect.

It follows that one must possess a variety of cloud negatives, if artistic landscape work is aimed at, and their use must not violate the laws of composition. Better than all rules is a subtle feeling for effect, which, unfortunately, is not a common possession.

EYES OR PLATES.

By Joseph R. Husson.

This is the query which suggested itself to my mind some years since, when a ruby lamp was the illumination of my dark room, and this little article is presented to the INTERNATIONAL ANNUAL with the hope of benefiting some fellow amateur who

may be suffering with his eyes as I did in my early photographic experience.

Whether it was the quality or quantity of light which hurt my eyes I will not pretend to say, but the effect was such that I almost dreaded dark room practice. Finally I consulted an oculist and was advised to give up developing plates until my eyes had regained their normal condition. During the following of this advice I made diligent inquiry into the manner of dark room illumination and was surprised to learn of the number of amateur photographers who felt the injurious effects of a ruby lamp.

I need not enumerate the various plans adopted by the many; but I resolved to try the method of my friend, Mr. Henry J. Newton, viz.: Daylight through the medium of orange and green.

As many amateur friends upon visiting my dark room have expressed their amazement and delight at the quality and quantity of light indulged in, I will endeavor to give a brief description of the method of illumination and my manner of handling plates.

My room is an ordinary hall bedroom 12 x 17 feet, one window with southern exposure, plenty of sun when desired.

Inside of the sash, like the rest of the windows in the rear of the house, hangs an ordinary buff shade, inside of this is an extra sash divided in the middle like the sash proper, excepting that the upper sash rests upon the lower which in turn rests upon the window sill, and all is held in place by tiny bolts which run into the window frame; the entire affair is very light and easily removed for the purpose of washing windows, etc.

The upper so called sash is simply a frame covered with several thicknesses of opaque muslin and is readily lifted off when the light is needed. The lower inside sash is made of wood, half inch stuff, in which are two lights of glass 12 x 17 inches each, one consists of two panes of orange and green and the other of amber; the latter is fitted in a hinged fame and opens inside like a door, that I may raise or lower the shade and window, and is also very handy when toning prints to see the precise color. Inside of all I have a curtain of orange silicia hung like portierres and readily pushed aside if not needed.

I have also a small red curtain which I hang in front of the panes of glass if the day is very bright.

With these contrivances it is very easy to regulate the light, and I have never found any inconvenience to speak of in the changeableness of daylight, and above all have had no recurrence of the trouble with my eyes.

I have never tested the actinism of the light, but I have never observed any injury to my plates from this source, and yet one can readily understand that with two lights 12x17 inches each, although well diffused, how generally and pleasantly lighted the room is.

In handling plates previous to their being covered with the developer I almost invariably stand some six or eight feet from the window and my back to the light, the plates being as it were in the shadow of my body. I sometimes use this precaution during the early stage of development especially if using hydroquinone and approach the window when closer examination is necessary, and then hold the tray so that the plate is protected from the direct rays of light excepting during the moment of examination.

I believe, then, that it need not be eyes or plates but *eyes and plates*, saving the former by having sufficient pleasant light, that one is not straining them trying to see while in the dark room and striving not to see when leaving it, and saving the latter by not being obliged to put them too close to the direct rays of light in order to see how to properly manipulate them.

ALKALINE DEVELOPMENT.

By Frederick A. Jackson.

Beginning, as most of the earlier amateurs began, with our old and tried friend, the oxalate developer, the writer soon became dissatisfied with the latitude allowed in the use of this otherwise trusty servant of the dry plate worker, and being quite inclined to experiment for something better, adopted in its stead the alkaline-pyro developer. Following, for several years, the ever changing formulas of the plate makers, with varying and sometimes surprising results, he at last determined to try a few variations with a view of securing some combination of chemicals which might be depended upon, after thorough trial, to yield expected and desirable results. These experiments have now extended over some three or four years; have been very

1 oz of Seed Sol. pyro contains about 2 ... P...
" " " " Carb. Sod. " about 9 7/15 ...

carefully made, and lead to the entirely trustworthy and simple formula which it is the object of this article to recommend, with the assurance that it is the outcome of practice, independent of any theories, either preconceived or advanced by others.

Write 1st
1/2 oz Sol Pyro
3/7 " Carb. Soda
6 oz water

If ten grains of pyrogallic acid be dissolved in four ounces of water, and this solution made alkaline with two grains of refined carbonate of soda, it will fully develop the most rapidly exposed plate. All the detail that can possibly be secured by any greater number of grains of the alkali, these two grains can induce to come forth; they are equal to the perfecting of the development, but they will probably require at least an hour in which to perform their work. By increasing the soda to ten grains, development may be effected in from ten to twenty minutes. If development promises to be long, by all means use a sufficient quantity of the sulphate of soda to keep the solution clear. A still greater increase of alkali will, of course, produce more rapid development, if time be the all important object; but let it be borne in mind that with quick or forced development comes, first, a thin, almost imperceptible veiling of the image, and then, as successive quantities are added, fog. Not only this: beyond a certain well defined point, the too free use of alkali, by many vainly supposed to "force out detail," results in a slow reduction of the image. This reduction keeps almost even pace with the development, and it is not discovered how superficial the image has become until the plate is taken from the fixing bath. Too many have had to bear disappointment from this source—and all so unnecessary. There are other reasons why a moderately rapid development is to be commended, not the least of which is that the slower method produces much finer deposit, and therefore, negatives so made yield far superior enlargements. A quickly developed negative, unless flat from over timing, is always coarse, showing the textures of the film too plainly under magnification to produce attractive enlargement.

The proportions which have been named are for very quick plates, but the only chemical requiring any change is the pyro. The soda remains constant for any and all development; the same for lantern slide or transparencies as the quick plate. Where plates register as low as sens. 16, reduce the pyrogallic acid to two grains to four ounces of completed solution.

The method here given will not perform the work properly appertaining to the emulsion, nor will it make up for all the

shortcomings of the operator, such as under or over timing, but it will perfect all that it is possible for a developer to accomplish. This the writer claims for it without hesitation.

Never bathe the plate in the alkaline solution previous to development, if you care to produce a "crisp" or clear negative. With some plates it does little harm, perhaps, but it never does any good.

NEW HAVEN, CONN.

CUM GRANO SALIS.

By Dr. John H. Janeway, U. S. A.

To the earnest worker in any branch of labor, the discovery of a new method, or the introduction of a new material, whereby a process may be shortened or materially improved, is always a source of delight; but at the same time it is apt to be regarded by him with considerable doubt, until either by his own experiments or those of others in whom he places implicit faith, it is proven to him that the process or material is one that at least is entitled to his consideration, if not adoption. Others there are, who, from their very constitution—mental—enthusiastically espouse and uphold from the start, the claims called for by the new, without questioning or experimenting. Others again who, from some cause or other, not having been very successful with the old, rush for the new, in hopes of securing better results with it; and very often these are the very ones that by some lucky hit, obtain in their first efforts, to them, wonderful results, and hence for the time being are its very warmest and most outspoken advocates, claiming for the new, most wonderful powers and almost unattainable results. One of the many claims made by these for hydroquinone as a developing agent, is its keeping powers, and the results of the following experiments—a few of many—made at the request of a friend, to obtain a one solution developer containing hydroquinone which would possess good keeping powers and at the same time considerable strength and activity, is the cause of the quotation at the head of this article.

The hydroquinone used in these and other experiments was manufactured by E. Schering and F. Murck, and from unopened bottles, until uncorked for the preparation of the developers. The water used was melted ice, heated to 100 degrees Fah, the salts dissolved in it, and then filtered before the hydroquinone

was introduced. When introduced the bottles were well stopped and the hydroquinone was dissolved by the aid of a warm bath and agitation.

I choose the following: These formulas were taken from various standard photographic journals, and highly recommended by their authors for their good qualities, and especially for their keeping powers.

No. 1.

Water	34 oz.
Carbonate of Potash C. P.	2 oz. 5 drams.
Sulphite of Soda	2 oz. 5 drams.
Hydroquinone	3 drams, 57½ grains.

Mix and dissolve.

Claim.—To be of a light port wine color when made, transparent, and remains so indefinitely.

Result.—24 hours after preparation, color and consistence almost that of old sugar house molasses; produced no result on an exposed plate.

No. 2.

Carbonate of Soda	7 oz. 7 drs. 18½ grains.
Sulphite of Soda	2 oz. 1 dr. 45 grains.
Water	34 oz.

Dissolve by heat and add

Hydroquinone	2 drs. 38½ grains.

Claim.—Light sherry color, and keeps for a long time.

Result.—Became so muddy after developing one plate 6½ x 8½ that it was thrown away, as was also the unused portion on the third day.

No. 3.

Water	20 oz. 2 drms. 18 mims.
Carbonate of Soda	4 oz. 6 drms. 35 grains.

Dissolve.

Sulphite of Soda	2 oz. 3 drms. 17½ grains.
Water	10 oz. 1 drm. 19 mims.

Dissolve and add to the above and then add

Hydroquinone	3 drms. 34½ grains.

Claim.—To be very active and will bear dilution with ½ its volume of water, and keep well.

Result.—Clear till the third day. Coloration then began and

progressed rapidly. Very active till the third day. On the 5th muddy and inert.

No. 4.

Water	32 oz.
Hydroquinone	75 grains.

Dissolve and then add

Sulphite of Soda	1 oz. 4 drms.

Agitate till all is dissolved and then add

Carbonate of Potash	2 oz. 4 drms.
Bromide of Potash	15 grains.

Let stand for 24 hours.

Claim.—Clear and keeps well.

Result.—24 hours slightly colored, but gave good results. 3d day decidedly colored, and slow. 5th day very muddy and almost inert.

No. 5.

Water	34 oz.
Sulphite of Soda	2 oz. 3 drms. 17½ grains.
Carbonate of Soda	4 oz. 6 drms. 35 grains.
Acid Citric	1 drm. 17½ grains.
Acid Salicylic	15 grains.
Hydroquinone	2 drms. 38½ grains.

Claim.—Light sherry wine color, and remains so and quick.

Result.—Somewhat darker and slower than claim, but gave fine results in the half tones. No staining of the film. A large number of plates were satisfactorily developed and the portion used seemed to retain its powers wonderfully. An unused portion remained clear over three months.

No. 6.

Sulphite of Soda, cryst	1 oz. 2 drms. 17 grains.
Hydroquinone	1 drm. 17½ grains.
Carbonate of Soda	2 oz. 3 drms. 17½ grains.
Water	6 oz. 6 drms. 6 mims.

Dissolved by the aid of heat.

Claim.—To keep indefinitely in this concentrated state, while the diluted keeps only two weeks at the farthest.

Result.—24 hours, concentrated solution very dark; diluted too muddy to see the plate. Concentrated useless at the end of six days.

Other experiments with published formulas might also be

given here, but why extend the record as the results were practically the same.

Enough have been presented to prove, that in a choice of a formula for a new developing agent, no matter over how distinguished a name, *cum grano salis* is to be observed, and that it is wise to prepare only a sufficient quantity for use until you are satisfied that it is well up to what is claimed for it. And here let me digress for a minute with a hint to the amateur societies. Would it not be much to their advantage, and at the same time be of incalculable benefit to a great majority of others who may not have either the ability or time, to test carefully all claims of new formulas and new agents, as published in the photographic journals, and publish the result of their experiments under the sanction of their respective societies. I am certain that the journals would gladly spread these results, and I am equally certain that a great many new formulas would never see the light.

Unbounded praise and extravagant unthinking claims will as certainly damn as faint praise, and for this reason frequently a really valuable formula or article is compelled to pass out of the memory of man. Sometimes to be reproduced as is the case with hydroquinone, but more often something new appears and that is the end of it.

Many of the enthusiastic claims for hydroquinone are fast being disproved, or must be taken with many a grain of salt. That it will not stain the fingers, I am certain cannot be proved, and I am also certain that it rapidly causes a roughness and irregularity of the finger nails, and possibly more damage than that. As to its cheapness, it is certainly a mooted point. But to my mind the claims that are so constantly and persistently. put forward as to its ability to develop an under, or over exposed plate, equal to one of normal exposure, and that, too, without the care, attention and judgment which these claimants acknowledge is required when pyro is used, is one that is fraught with great danger to the future of our art science. If true, the whole science, for I claim it to be a science, of development becomes a mere mechanical art. Simply placing the exposed plate into the developing solution and calmly waiting for the deed to be accomplished, what need then for an accurate exposure or attempting it? The developer will make it all right, no matter how short or long you may expose the plate. That hydroquinone is a very valuable agent, and doubtless will yet

prove to be of great use in photography, when its powers and infirmities are better understood than they are now, I am willing to, and cheerfully do, acknowledge. But until that time arrives, will it not be well, in order to spare the innocents, to make frequent applications of *cum grano salis*?

A GLOSSY AND MATT SURFACE.

By J. Chester Jervis.

This is a case of appeal for a fresh trial. Aaron Penley, in his treatise on Water Colors, says, in speaking of gum, "Glossy in character and employed chiefly by figure painters. It is seldom required for landscapes, except perhaps to assist the brilliancy of figures or cattle, and to give additional force and transparency to objects in the foreground."

The most effective wood engravings I have seen of late are four published in London by *The Graphic* on 23d February, of pictures exhibited in London at the Royal Academy and other galleries, and these wood engravings are all on enamelled paper as glossy as albumenized paper.

The illustrations in *Harper's Magazine* are much to be admired, and these are all on glossy paper.

Much might be said on glossy surfaces in reference to the Dutch and Flemish oil paintings.

Frescoes are not more artistic than oil paintings as a rule.

In matters photographic, "matt surface" has, however, had many verdicts in its favor lately and has almost engrossed the attention of the photographic fraternity on the subject of printing. I have hitherto treated my subject in the abstract. The various photographic processes, however, have each special advantages.

Platinotype is pre-eminent in pure landscape, admirable in some specimens of portraiture, but in any case a choice negative is a *sine qua non.*

Bromide papers are essential where increased sensitiveness is imperative.

Albumenized paper (our old, old friend! I have some excellent prints on paper I sensitized 30 years ago!) is and will be esteemed for its printing out qualities, its moderate price and its power to give "additional force and transparency by its gloss." Gelatine-

chloride paper (now I have come to my client), is pre-eminent where the salient points of a picture are sufficient to "make a hit"—"genre" pictures to wit—and moreover it is a good "all round" paper, and while having all the merits of the albumenized paper (except its cheapness), has qualities of which that falls short. *It does justice to all degrees of negatives*; it has excellent keeping qualities. Scarcely any expansion takes place on mounting, so distortion is avoided and the cockling of mounts in an album or on paper more easily overcome. The price as compared with albumenized paper may deter to some, but it should be borne in mind that there is no waste from imperfect or torn paper, and that no loss need be incurred by torn prints during washing or from failures in toning, and moreover the hypo is more easily eliminated. It is a little bit greedy for gold, but the extra outlay is a good investment if permanency be desired.

I know of only two brands in the market—Obernetter's (so-called) and Liessgang's, called "Aristotype,"—both are good. The former can be obtained in white mauve and pink. Prints from the mauve are the brightest.

As some condemn the paper, not knowing how to treat it, I will give an account of the mode, which is a very simple one, by which I successfully use it.

Print as deeply as is the practice with albumenized paper. Use a combined tonirg and fixing composed simply of hypo and gold, as recommended by W. Burton. I add a little nitrate of lead, with the view of preserving the purity of the high lights—this hint I took from the *Photographic News*.

FORMULA.

Hypo	250 grams.	or	Hypo	4 oz.
Gold	1 gramme.		Gold	10 grains.
Nitrate of Lead	5 grams.		Nit. of Lead	3 grains.
Distilled Water	1 litre.		Water	1 pint.

Put the prints untrimmed into this *direct from the printing frames*, turning each one over and over until equally wetted. The prints will then assume all kinds of ochres and browns until they settle down into a dark brown, then let them remain for fully a quarter of an hour, to ensure a black when dry. I have left them an hour without deterioration. It is quite possible that a good wash may then be all that is necessary—as we have, I

believe, W. Burton's authority for it—but I prefer "to make assurance doubly sure" by putting the prints direct from the combined bath into a freshly made, 15 per cent. hypo solution for five or ten minutes. By adopting this plan, I have no scruples in using over and over again such of the old combination bath as may be left, merely adding gold after filtration. Of course these baths are not everlasting as the prints, being dry when put in, absorb much. *Attentive* washing foro ne hour is sufficient, then a 10 per cent. alum bath for five minutes and a final washing of ten minutes. The prints can either be hung to dry—I use glass rods or a towel horse, first putting clean paper on the rails —or they can be dried on a clean, flat support, but the surface of the prints must dry spontaneously and before being mounted. The margins of the prints are likely to become blemished during manipulation in the toning bath, so they must be left untrimmed until dry. In Summer the paper is not so easy to manage as in Winter, unless the water is brought down to 60° Fahrenheit.

Some lovers of the paper go in for "squeezing" on glass, and I plead guilty to several deeds of the kind, and have gloated over some of the results—it is the nearest approach to the minutiæ of the gloss negative obtainable on paper—but I prefer the prints unenamelled. If squeezing be contemplated, the alum bath is essential, and I find the following mode successful: After well cleaning the glass, rub it with benzine in which a few small shavings of beeswax have been dissolved, then sprinkle on talc and rub gently until you get rid of the superfluous powder; place the print in pan to wash, place a piece of sheet India rubber over it, and with a squeeze get rid of as much of the water as practicable. In an hour or two, before the back of the print is quite dry, cut a piece of stout paper or cardboard about an eighth of an inch less in size all round, paste it with good arrowroot or starch paste, rub some of the mountant over the back of the print and bring the two into contact. When dry the mounted print will fall off, to be "a thing of beauty and a joy forever!"

PHOTOGRAPHIC OBJECTIVES.

By Chapman Jones.

It is a general property of photographic objectives that their defining power declines from the centre of the field to its edges,

LEIMTYPE.
BY
Husnik of Prague.

and this quite independently of curvature of field. In order to cure this defect it is necessary to use a stop; and the larger the plate that a given lens is required to cover, and the greater the perfection of definition required at the edges of the plate, the smaller must the diaphragm be. The photographer is thus limited to slow lenses when wide angles are to be included, and the relation that exists between the angle of view and the rapidity of the lens enforces a very undesirable restriction upon him.

It is, perhaps, too much to expect that opticians will ever be able to construct a lens that shall have a flat field and an equal defining power over the whole of it, so that the stops shall be necessary only to secure the necessary depth of definition. But there is little doubt that the greatly increased resources lately placed at the optician's disposal by the managers of the optical glass works at Jena, are likely to make possible a decided advance in this direction. Indeed, there are rumors already abroad that something has been done, and it is very well known that Jena glass is being largely used for photographic objectives. But the mere fact that glass comes from Jena, or from Birmingham, or from Paris is a comparatively trivial consideration. The glassmaker merely supplies the raw material and it is the optician's skill that makes the most of what he has at his disposal. Professor Abbé and Messrs. Schott and Gen have done their work nobly and well, and photographers are now waiting for opticians to give them the utmost benefit of the material from the Jena factory.

LANDSCAPE WORK.

By Richard Keene.

The most delightful branch of photography is landscape work. There is so much variety of subject and so many different effects of light and shade in each, that it becomes a field of never-ending interest to the lover of nature. The sedgy margin of a river or the alder-fringed brook, the tumbling torrent in its rocky recess, or the placid lake, sleeping in silent beauty and reflecting the hills and trees by which it is surrounded, the wild moorland and the mountain, with their ever-changing cloud effects, "the ripe, green vallies" or lonely dells, all come within the grasp of the

outdoor photographer—not to mention the charm of old buildings, time-honored ruins and rustic cottages, with which our country is well sprinkled over. Indeed, there is no lack of food for the camera if you will only search it out, and the quest is not a difficult one. What sweet little bits of nature may be picked up in all kinds of country nooks and corners and out-of-the-way places, while from many an eminence we are led to exclaim:

> "Heavens! what a goodly prospect spreads around,
> Of hills, and dales, and woods, and lawns, and spires,
> And glittering towers, and gilded streams."

The poet has said that man is "the noblest study of mankind." I doubt if this be true, excepting in that he is a work of God, as are all the beautiful forms of earth and sky, and sea by which we are surrounded; therefore I hold that the landscape artist, whether with canvas or camera, has equally noble studies with the portrait painter or photographer, and he will not find Dame Nature so difficult to please as many of the dames in human form.

A few hints may be acceptable to unpracticed beginners, though the subject has been threshed out over and over again. First then, as to the outfit: landscapes should not be taken on less than half-plates, and this size enables the photographer to carry the whole of his apparatus comfortably, with a decent number of plates. If strong and not minding a little hard work, he will find whole plates better still. Beyond this size I would recommend him to take an assistant, unless he is satisfied with paper or film negatives, when a dozen or two more films are of little consequence in regard to weight. But don't commence photography with films—master negatives on glass first. It is usual to pack the camera, tripod head and three double slides all in one case—better put them in two, the slides in one and the camera in the other; you then get the chance of help from some kind friend or companion who will willingly bear part of the burden; or, you can sling them with a strap over the shoulder more easily than if in one, huge package. I also prefer leather cases to any other, even though a little heavier, as they afford more protection to their contents. In any case have locks to prevent ignorant prying into the results of your exposures. By the use of a changing-bag, which may also serve as a focussing cloth, you can work with only one slide and a

light-tight box of plates; but great care must be exercised, as the rapid plates of these fast days will stand no light nonsense. It is well to have three or four lenses on a photographic tour, to meet different requirements, and the camera should have a long extension of bellows; this will give power of using a long-focussed lens for distant objects, mountain scenery, etc. A wide-angle lens is sometimes useful in architectural views, but only use it when quite obliged. Better than all perhaps, is to be able to place your camera in the exact spot giving the best arrangement of subject and to adapt your lens to it—this can be done by carrying with you a combination series of lenses. Don't buy a cheap camera, or one of too light a make, and be it ever so good and trustworthy, cover it with the focusing-cloth when drawing out the shutter and exposing. It is unsafe to leave your camera standing in a meadow where cattle are grazing while you are prospecting for a good point of view—cows are curious creatures and will probably turn it over. I once left my focusing-cloth hanging over the rail of a fence, and when I turned to use it, found it had half disappeared down the throat of a great colt who was trying to swallow it. This is not a common accident, however, but in the old wet-plate days, I have more than once had to race from the tent to my camera, to save it from bovine curiosity. Thickly coated slow plates are best for landscape work, fully exposed and slowly developed. Never take a view with the sun at your back, it will be flat and uninteresting; a side light makes good shadows, separates the different planes, and gives pluck and sparkle to the picture. Some of the finest effects are got with the sun shining *almost* into the lens, which must, of course, be shaded. Morning and afternoon views are to be preferred to those taken at midday, especially in midsummer and where trees predominate. If you are fond of a pipe, mind the smoke therefrom does not cross the front of your lens during exposure. I have often wondered why so many photographers smoke. Why is it? In the bygone days of wet-plate work I can understand it—it served as a "counterblast" to the fumes of collodion in the reeking tent; and in the happy days of collodio-albumen or beer it served as a solace while sitting on the lee side of the camera during a six or eight minutes' exposure. These excuses, however, are not applicable in the use of gelatine plates. I don't know which is the greater pleasure, exposing plates or developing them,—perhaps

the latter when they come right. The most perfect negative, however, may need some little help from the brush or pencil before it is fit for printing from (some require a good deal); pinholes want stopping out, deep shadows making more transparent, etc. Whatever you can do to improve the resulting print, either on the negative or during its exposure in the printing frame, or by adding a properly-lighted sky, do it; and don't listen to the antiquated, though not obsolete, twaddle about "untouched negatives." Touching by Tolley even, one of our best landscape workers, cannot be passed over by some critics, but is simply Tolley-*rated.* Only use discretion with your color and advantages will follow; above everything, let your work be as good and clean as possible, remembering always that "our native charm" beats "all the gloss of art."

PHOTOGRAPHY IN RELATION TO ART IN LANDSCAPE.

By William R. Kennan.

The public are apt to class all the followers of the Photographic Art as those who merely deal with a mechanical pursuit.

This, though unfortunately true of some, is happily quite false of the real lover of the art.

Just as it is with painting—the colors, canvas, brushes, easels, etc., employed in the making of color pictures, are but the mechanical appliances of the artist painter, and answer to our cameras; lenses, chemicals, etc.

In order to produce an artistic picture by either method means the presence of an artist who is capable to feel and see in his mind's eye the effect wished for—no guess work will do. Naturally, the mechanical education must in either case be thoroughly mastered. The artist painter has first to conquer the mastery over his brushes, colors, etc., so as to be able to use them with the utmost facility of hand and eye; the photographic artist must likewise be thoroughly master of the mechanical and chemical processes of his art; but in either case the artist will never succeed if he does not possess the feeling and love of the beautiful in nature. Certainly the painter can produce an effect, whether of lighting or color, that may not be present at the time when he is making his transcript from nature, but to make a true picture it ought to be possible for nature to present such an

appearance as he gives to his painting. We grant that the painter has the immense advantage over his photographic brother in being able to substitute details or omit those that may be out of keeping with his subject, thus making a picture of a scene where the photographer would be powerless. And above all, the painter has the power over color; this will, of course, always place the art of painting pre-eminent, for as far as we can see Photography must be content to deal with monochrome, but in this the photographer can stand unrivaled if he be a true artist. He may have to wait hours, days, aye, months, ere he can secure Nature in the mood he wants her to appear in, but we maintain he must be as an artist the equal of his brother painter to judge and grapple with Nature beforehand.

SOME THOUGHTS ON THE MORAL ASPECTS OF PHOTOGRAPHY.

By Dr. H. Valentine Knaggs.

"Let's shift away; there's warrant in that theft."—SHAKESPEARE.

The eighth commandment tells us that we should not steal, but it vaguely leaves open the question as to the class of articles to which it is referable. If the predatory habits of mankind are really to be kept in check, the plan adopted by customs ought to be followed out in other walks of life. A regular tariff of goods, from which umbrellas and landscape photographs are at all times exempted, ought to be framed for use in photographic circles. How can this commandment relate to photo-pictures of nature, even though they are taken in prohibited quarters? Unless sold commercially or under a copyright, scenic views belong to no one, if we except the Creator of the universe, the man with a camera, or the artist of the pencil or brush. Besides in the time of Moses, absolutely nothing was known about the black art, or Nineteenth Century manners.

Has the proprietor of a glen, waterfall, picturesque park, or other interesting pieces of scenery, an inalienable right to control the picture-maker and restrain or prevent his impetuosity in taking views thereof? I think not. It is quite justifiable, from my point of view, to steal a march on these gentry even if a resort be made to that modern abomination, a miniature, or pocket camera. The detective, or hand camera is too well known and

much too easily recognized for concealment as is equally the case with any of the ordinary, although compact forms of apparatus.

The Anglo-Saxon race has a distinguishing feature in the manner in which this commandment is regarded. The English-speaking individual, be he American or British, who has successfully smuggled a dutiable article through a Custom House, imagines that he (or she; it is as well to add) has done a really fine thing. Nor can anyone convince such a person to the contrary. Very few, however, will think it worth their while to engage in such a pursuit, " le jeune vaut pas la chandelle," as the French put it. Failure entails too heavy a penalty. To be mulcted in a heavy fine or provided with free board and lodging for a spell, is more than one's weak nerves can stand. A person transgressing in this way has only himself to thank when caught, and, like a sufferer from toothache, gets but little sympathy. None the less the successful smuggler has my cordial admiration. Is this stealing in the strict sense of the word? Some will tell you that you are robbing the Government of its just dues, others, on the contrary, will meet your query with an equally positive no. Johnson, who framed his definitions in the absence of a Democracy, and to whom the modern Socialist would appear to have been unknown, defines a smuggler as *a wretch* who in defiance of justice and the laws, imports or exports goods either contraband or without payment of customs.

Somewhat similar sentiments prevail in the breasts of enterprising photographers anent the art-science and stolen views. With a quick plate and a trusty shutter, opportunities will continually present themselves. The risk of any very unpleasant consequences is small; who, among us, does not look back upon with pleasure, and prizes most, those views which have been obtained under difficulties or which have been surreptitiously secured, and very often disdainfully rejects others, taken in an orthodox fashion or without any trouble at all.

A certain sense of danger, or of a liability to rouse the ire of a person unknown, only adds to our enjoyment in stealing views. If a specified sum be paid for the luxury of entering an enclosure, there should be no reason why we should not add to our stock of negatives and obtain better return forthe money expended than would otherwise be the case. People do not ascend dangerous

mountains merely to get the view from the top, or to take the air in that quarter; they have no time to consider that. Their anxiety on reaching the summit is to get down again as soon as possible. Besides, the view from some of the more accessible peaks in mountainous districts, as is well known, is quite as good. It is the danger that gives a piquancy to their adventure. The possibility of tumbling down a precipice is looked forward to with much exhilaration.

Here then is one side of the picture; let us now look on the other. What can we say bad enough to describe the operator who is mean enough on seeing a good photo, to go to the same spot and take exactly the same view over again for himself, thus robbing the first and original picture-maker of his careful brainwork? Why, he ought to be "boiled"!

Or what punishment is good enough for the man who takes your pet prize medal picture, and after carefully copying it and submitting it to the retouching process so as to give it a new face, then palms it off as his own production? The petty thief who comes into your hall and steals your Sunday hat or boots, is a king compared to this fellow. Besides, the knowledge requisite to produce such a copy, should induce him to make a better use of his skill.

I say nothing about the much vexed question of copyright. It is generally acknowledged that in portraiture, the professional has an exclusive right to his negatives, provided he does not exhibit, circulate, or vend copies of prints to the detriment, annoyance, or without the consent, of the sitter. But the man who makes use of a detective camera to take a view of his best Sunday girl when out with another dude, or who makes use of his camera for any other equally salutary object, can hardly be called a crank.

We have come to this pass, that like the much vexed question as to who or what constitutes an amateur, we have in addition to adequately define a photographer freebooter. How will this do for a beginning?

A man who takes views in enclosed grounds without the knowledge and permission of the proprietor thereof, is no thief, provided his productions are on his part, original, and that they are not sold commercially; but a person who purloins for his own base ends the works of others, is a villain of the deepest photographic dye.

EASTMAN STRIPPING FILMS.

Wm. Lang, Jr., F. C. S.

As every photographer knows, a paper negative is in no way a new thing in photography, it is as old as the science of photography itself. There exist here and there early specimens of Calotype, or to give it the name by which, perhaps, it is more generally known, Talbotype, which show as perfect results as it is possible to obtain with the more rapid gelatine plate of the present day. The advantages of a paper support, say for the scientific traveler, are simply uncountable; but when the sensitive gelatine emulsion we now make use of came to be applied for the production of paper negatives, the two drawbacks manifest in the early days, viz., slowness of printing and the presence of the grain of the paper, were no less present in an emulsion paper negative. The stripping negative of the Eastman Co., where the paper, before being coated with the sensitive material, has received, in the first instance, a coating of freely soluble gelatine, enables us in a very simple manner to get rid of the paper. The necessary rigidity to the image-bearing film is supplied by the transparent gelatine skin which takes the place of the original support. It is not my intention to go into all the details connected with the stripping of an Eastman negative; I merely would like to call attention to one or two minor points which may be of service to those making use of these films for the first time. Many failures arise from the water not being sufficiently hot; it is astonishing how high a temperature the image-bearing film laid down on the collodion bed will bear without damage. I strongly advocate the use of water rendered slightly acid by means of hydrochloric acid; it not only renders the stripping operation an absolute certainty, but it has a beneficial result, inasmuch as any staining that may have taken place in the development is entirely got rid of. The temperature of the water, where acid is employed, need not exceed 120° F. In the placing of the skin upon the negative, this operation must be conducted without any undue waste of time, otherwise the skin becomes perfectly unmanageable. The squeegee made use of by the writer is simply the back of the hand, which has been previously moistened by application of the soaking solution recommended by the Eastman Co. If the skin has not been allowed to swell inordinately, there will then be no difficulty in getting

rid of air-bells, and even should they remain, although they do not improve the appearance of the finished negative, still they do not interfere when printing comes to be done. In removing the skin with the accompanying image-bearing film from the waxed plate, be sure that the whole is uniformly dry, otherwise your negative will never lie absolutely flat. A point to be attended to in connection with the glass plate which, after being collodionized, receives the negative previous to its being stripped, is that it be a little larger each way than the size that is being laid down. For a whole plate negative the plate should be, say 9 x 7. I think the Eastman Co., in recommending a form of the sulphite developer do well, as in working with a picture where perhaps some forcing is necessary there would be much more staining of the film were the ordinary pyro developer made use of, and as we have to view the process of development through the paper, staining would interfere with the proper judging of the true density of the image. As it is, the development of the negative has to be carried on to a point as if it were being overdone. A negative that looks strong with its paper support attached and viewed in front of the usual dark room lantern will very often appear a very thin negative indeed when the stripping is done. In consequence of solutions acting from both sides of the film the operations of developing, fixing and washing are more readily and speedily accomplished than in the case of glass plates. I will conclude by a word of warning. Of course I am supposed to be addressing a tyro in the act of stripping a film; and that is there must be no alum bath at any stage of the operations.* The reason is obvious. You would convert the soluble layer of gelatine into an insoluble one and no power on earth would enable you to "strip." This warning is necessary, seeing the alum bath plays such an important part where glass plates are concerned; but here we have not the bugbear "frilling" to contend with. Paraphrasing the adage, we may say what is one negative's meat is another negative's poison.

DETECTIVE HAND CAMERAS.

Article II.

By Paul Lange.

In last year's Annual I have fully described the kind of camera adopted by me for this work, and though a very large number

of new designs of hand or detective cameras have been placed upon the market since, I do not feel disposed to alter or add to any point in the principal features of the camera then explained.

The continued experience in its use has brought forth to me no essential improvement as required, but the further successes secured with it have endeared it to me more and more, the practicability of being able to secure with such apparatus

"MEMENTOES OF LIFE,"

at a moment's notice, embodying ever fresh and untold fascinations.

The present rage for such outfit shows that the fever is still increasing, and I feel sure that all "successful" operators will gradually abandon all other cameras when once they have attained the point to make with these "hand cameras" *certainties* of their exposures.

Experience, patience and a well designed apparatus is the only sure road to such proficiency, but can never be reached with the numerous "*novelties*," "*toy boxes*," and other designs so largely advertised, and with which I regret to see the market overcrowded.

While on this point of the subject, I do not advise even the use of ¼ plate, all my work and that of most of my successful brother amateurs has been taken on 5x4 plates, which leave plenty of latitude to secure perfect results. For those amateurs that intend to go in for this class of work a few hints might be acceptable as to

"HOW TO USE THESE HAND CAMERAS."

First of all, do not attempt to do almost impossible things with them.

Fair weather—not exactly sunshine—is necessary for success.

Another main point is the shutter must be a *rapid* one; the obtaining of sharp images of moving objects makes this, in my experience, a necessity.

The shutter has to meet several contingencies, such as the moving of objects, the movement of your own body, mind, and what not else.

I have generally found that the "quicker" my exposures, the "better" my results, so that of late I have adopted the double curtained shutter principle, without exception.

Do not attempt to take regular "*scenery*" pictures with it.

If the apparatus can be converted into an ordinary camera on tripod and stand, well and good, but otherwise it is not intended nor fit for it and leads to nothing but disappointments.

Provided the aforesaid conditions are adhered to, the "second" largest stop of any rapid symmetrical lens made should be used. "*Street*" scenes, however, are more difficult to secure, and for such the full aperture is advisable.

I need hardly say that "marine" subjects, or pictures on "sea" or "water," allow the quickest exposure with small stop; but even for such I rarely if ever use a smaller opening than the second largest above referred to.

Of course my camera is arranged for altering focus, but on that point my experience shows that out of 100 exposures, nearly 90 per cent. have been made at a point when my lens (Ross' Rapid Symmetrical) does not require further focusing.

The most difficult task I found to be the taking of very "*near*" moving objects, say within five yards range of your camera. Under those circumstances, nothing but a very rapid shutter, going quicker than $\frac{1}{100}$th part of one second, is absolutely necessary; and, on the other hand, the "judging" of the exact focus is the further important obstacle in your being able to secure a perfect picture.

In my last year's article I have already pointed out how important to my mind is the outward appearance of the camera, and that such must not show too flagrantly its "*photographic*" nature.

Hand cameras of any make that have to be held in front of you, so that everybody's attention must be attracted to you by such position, are simply rubbish and not worth the expense.

The charm of securing

"SCENES FROM LIFE"

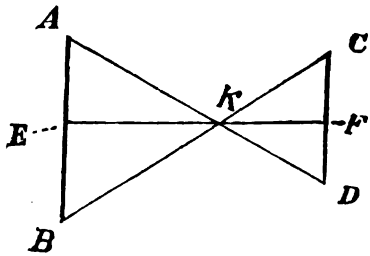
lies in everybody in the picture being unconscious of the fact, otherwise the object of your exposure is an utter failure, and the picture not worth having.

Anybody bearing the above points in mind, when using a hand or detective camera, will, I feel sure, become soon an expert and derive immense pleasure from his successful exposures.

SIMPLE METHOD OF FINDING FOCAL LENGTH OF A LENS.

By the Rev. F. C. Lambert, M. A.

The method usually given in text-books, that of arranging the distance between the object, image (on ground glass) and lens, so that the size of the image and object are equal, is seldom of use to the camera user, because very frequently it happens that the camera does not extend far enough to carry out this plan. In such cases it will be found simpler to use the following plan: Cut out a piece of card, newspaper, etc., exactly four times the size of focusing screen (in that part of it which is *not* hidden by the woodwork frame). Fasten this against a wall, in such a position that its center is exactly opposite the axis of the lens, and the image of the center of the paper coincides with the center of the ground glass, and "dodge" the camera about until the image of the whole piece of paper EXACTLY fills the focussing area (in other words, until the image is a quarter the area of the object, or one-half the linear dimensions). Now, measure the distance between the center of the ground glass and the center of the paper (having removed the lens without altering the position of the ground glass), double this distance and divide by nine.



E. g., if distance between the paper and ground glass be 45 inches, the focal length would be 10 inches.

Let AB be object.

CD — image.

K — lens.

Then since AB = 2 CD

$\therefore$ EK = 2 KF

$$EK = \tfrac{2}{3}\,EF \text{ and } KF = \tfrac{1}{3}\,KL \text{ is } \frac{1}{EK} + \frac{1}{KF} = \frac{1}{f}$$

e. g., $f = \tfrac{2}{9}\,EF$

THE FRAMING OF AN EXHIBIT.

By Edward Leaming.

Most of the exhibitors at any of our photographic exhibitions bestow the utmost care upon the making of the negative and the print, but leave the framing of that print to some indifferent person whose only care is to finish it as quickly as possible. This seems to be the case at least to almost all observers. The matting and framing of a print, however, are as well worthy the exhibitor's attention as anything connected with the production of that print, for upon the matting and framing depend to a large extent, the first impression and good or bad effect it may have upon the beholder. The primary idea in framing a picture, photograph, etc., is of course to give it a finished look, then for an exhibition the mat and frame together serve to separate that individual picture from other surrounding pictures, so that they will not interfere with, or detract from it. The mat then, we may say, is the first consideration; this should be in size to suit the picture it surrounds. I have seen an exhibit of several frames by one man in which one of the pictures was less than half the size each way than any of the others, yet the frames were all of the same size, the space being taken up in this one frame by the mat; now all the other pictures exhibited by this man were matted in good proportion and looked well, but the single exception was not enhanced by the large white English mat surrounding it; on the contrary, the picture seemed to be made smaller than it actually was, in fact it had the appearance of being crushed on all sides. As a general rule the best proportioned mats in my estimation, show between the picture and the frame from 2½ inches for small pictures, to four inches for the larger sizes. I do not think that anyone who has given the matter much thought would select a plush mat or frame; such have been exhibited, but they only emphasized their unfitness for the purpose to which they were put, the eye being distracted by the frame and its incongruousness; they should teach the lesson, however, that the most effective mat and frame are the least conspicuous in themselves; in this case, as in many other matters of taste, the simpler the better; gilt lines in the mat or a gilt beveled opening to the mat are to be avoided for much the same reason. The best mats are made of English cardboard, covered with a thin rough paper like the French

Torchon paper, or egg-shell paper, etc. The color of the mat should be an item for consideration, white is nearly universal and probably is the safest to use in general, but white does not give the best effect to most photographs ; the reason why is that the high lights in the print are never as white as the white English cardboard used for mats. When closely compared the highest lights in the print will look almost gray beside the mat ; more especially is this true of bromide, platinotype and plain paper prints which, being on white paper, one would think should be as white as the mat ; but they have been through a number of processes and baths of different kinds, and undoubtedly these have contributed to degrade their original purity. The albumen print is generally made upon what is known as pensé paper, that is, it has been stained a light pink with analine, and therefore has a warmer tone than the others mentioned, but the same remarks apply to prints made on this paper, but in a different degree. When a print, then, is surrounded by an expanse of white cardboard, the whole tone of the print is lowered ; the highest light is not in the print, it is outside of it on the mat ; this, of course, cannot do otherwise than injure the effect that this picture is intended to produce upon the beholder. If now we try tinted mats on the same picture, we will be surprised at the change ; some tints do not improve, others do ; in general it will be found that a cream or a light gray is the best. A gilt mat on a rich golden brown toned print is very effective and suitable, but would be very trying upon any other tone. A very effective and finished way to mat the print is to have the print with a clear margin of from ¾ to an inch all around, then have the mat surrounding this, or varying it by having a double mat, the inside one projecting from a ½ in. to ⅝ in., or printing the picture upon a large sheet of paper, the margin being protected from the light by a suitable mat. When finished the picture and the mat will be one and the same sheet of paper. All these matters are of individual taste and give very good opportunities for its display. The framing should, of course, agree with the matting ; a gilt frame rarely agrees with a photograph ; the best are probably the light natural woods made up very simply or stained wood. One very handsome frame is made in white enamel with sometimes a small gilt line around the outside edge, or fine gilt beading on the interior, in this case the gilt being a valuable addition instead of a harmful

one. These enamel frames can be tinted to correspond somewhat to the tint of the mat, which is often desirable. Showy or loud frames are to be avoided, such as are called architectural, and those with rope running around, and anchors, sea shells, etc., on the margins. Finally, frame every picture that you exhibit separately. Large frames full of pictures look well in a general effect upon the walls of a gallery, but when you come to look at the pictures in those frames, you will find that they hurt each other by their proximity; if each one was in its own matand frame, each would gain in value by the separation.

CARBON PRINTING IN WINTER: A HINT.

By Clement I. Leaper.

Having had occasion during last Winter to execute a large number of single transfer opals, I was for a time greatly puzzled at the difficulty I experienced in avoiding air bells.

Remembering, however, that during the Summer I had worked the process without a hitch, I was led to try the effect of warming the very cold tap water (then at 34° Fah.) in which the prints were immersed previous to being squeezed on the opal, so as to bring up its temperature to 54° Fah.

The result fully answered my expectations, air bells no longer made their appearance and I was spared the mortification of seeing my properly exposed and developed pictures utterly spoiled by ugly blotches of unevenly dissolved gelatine.

ON PRESERVING SENSITIZED ALBUMENIZED PAPER.

By J. Leisk.

The following simple contrivance for preserving sensitized albumenized paper may prove of service to those whose printing operations are carried on at irregular intervals, and who may find that the remainder of the paper that pleased them so well in May will not yield the same results in July, though it may seem quite good in appearance, and notwithstanding the fact that it has been kept in a *dark* and *dry* place. These papers have a third enemy to reckon with who is always at work, and who, despite the efforts of the makers to the contrary, will

sooner or later, as opportunity is offered to it, compass their destruction. I refer to the decomposition caused by exposure to the atmosphere.

Albumenized sensitized papers capable of resisting this action have yet to be made, but any of the better brands now in the market may be preserved for six months, or even longer, by the method here described, provided always the paper is *new* when received.

As soon as the paper comes to hand, if it is not already cut to size (which is best), proceed to cut up the sheets to size required, which, for the sake of illustration, I will assume to be half plate; then make it up into packets of a dozen or so pieces each, wrapping each packet first in waxed tissue paper, outside of which is a cover of orange or black paper to protect it from light. Ready cut-up paper in sheet packets require no further wrapping.

Next procure two pieces of ¾-inch deal boards of same width as a half plate, but two inches longer, and having smooth and even surfaces. Take two spoiled half plate negatives and glue them on to these boards, film side next the wood, leaving one inch of the wood free at each end. Next, procure your three-inch common screw nails, and make a hole in each corner of one of the boards beyond the glass large enough to let one of the nails slip easily through it up to the head.

Now place the *other* board on the table, glass side up, and pile the packets of paper accurately on the top of each other on the surface of the glass plate, and on the top of these place the first board glass side down, pass a screw nail through the hole in each corner and screw them into the lower board and tighten them up so that the paper is pressed firmly but evenly between the two glass plates.

We have thus an exceedingly cheap screw press, very effective for its purpose, the pressure serving to exclude the air and the glass plates preventing damp or other exhalations from the wood injuring the paper.

When a packet of paper is required for use it is only necessary to slacken the screws a little, withdraw the packet and tighten up as before. Too many packets should not be put into the press at one time, and I need scarcely remark that papers cut to different sizes cannot be preserved in one press, but as the whole affair can be made at a cost under sixpence the construction of a

press for each size of paper in use is not a very serious undertaking.

In conclusion, I may state that I have just now (in March) used up the last packet of some paper purchased in August and kept in a press as described, and that neither in appearance nor in printing or toning could I detect the slightest deterioration.

COMBINED BATH FOR TONING AND FIXING ARISTOTYPES.

By Dr. Liesegang, Dusseldorf, Germany.

A.—Water		12 oz.
	Hyposulphite of soda	2 oz.
	Alum	2 drams.
	Sulphocyanide of ammonia	1 dram.
	Common salt	4 drams.

Let this solution stand at least eight days, then filter.

B.—Water		3 oz.
	Chloride of gold	15 grains.

Mix.

Solution A.	60 parts.
Solution B.	7 parts.

and add 40 parts of old used combined toning and fixing bath.

The mixture gives the prints in ten minutes a red color, in fifteen minutes it tones to a splendid brown, and in twenty minutes to brownish violet. The action of the bath is quicker, if the prints are taken out of it after five minutes and laid flat upon a clean table. They continue to tone, and as soon as the desired color is reached they are washed in water.

The prints that accompanied the above formula were gems of beautiful toning.

THE DANGEROUS RED LIGHT.

By the Rev. G. W. Lincoln.

To the amateur, especially in the earlier stages of his career, there is no enemy which is more to be dreaded than fog from light striking the plate. The holders are carefully loaded, and the photographer trudges away to his favorite landscape, full of eager

anticipation. The camera is set up, the exposure made, and our photographer returns home perfectly satisfied with his efforts. But after the plate has been transferred to the developing tray, and the developer poured over it, his hopes are soon destroyed. Instead of the latent image appearing in the film, the whole surface begins to assume a dirty gray appearance, which gradually deepens until the plate has lost every semblance of its original creamy whiteness, and is of dull, ashen tint. The fog has done its work very effectually and our photographer feels that his time and patience have been wasted. He studies over his failure, and strives to find some explanation of the way in which the light could have struck his plate. He examines his dark room to see that no stray beam of light comes peeping through some cranny or crevice. The camera, the plate holders, the lens are all subjected to a careful scrutiny, and the perplexity is only increased by finding that they are in good condition and light tight. Every possible theory is advanced except the right one, and the cause of the fog is completely overlooked, "the red light."

For in a great number of cases the plates, which are lost through fog from light, can be laid to the score of the red light which glows upon the table, apparently innocent and harmless. This fact was first brought to my notice in the Spring of 1887, while visiting in the beautiful old city of Savannah, Ga. Some of my plates showed decided signs of having been light struck. There was no possible reason for this occurring, as my camera was absolutely safe, and I had taken the precaution to fill my holders at night by a "Tisdell Candle," which was said to be a trustworthy light. But one day, the secret was explained by a long streak of fog extending diagonally across the plate, as if it had been struck by a pencil of light. Recalling carefully the position of my candle and the way in which I had held my plate and holder, I was satisfied that the cause of the mischief was the red light. From that day, for the remainder of my visit, I filled my holders in the dark, and had no more trouble from fog.

In order, however, to give the matter a further examination, I resolved to test the lamp which I used in my own dark room. It is rather a homely affair, a railroad signal lantern, with a thickness of Carbutt's translucent paper pasted outside of the red globe. The oil used is lard oil, which though having some disadvantages, yet burns with a very steady flame and gives a

light of a yellower tint than that from kerosene. The plates which were used, were Carbutt's Eclipse No. 27, according to his sensitomer. They were selected on account of their extreme rapidity, as well as for the further reason that they would stand considerable forcing without any chemical fog taking place. Every precaution was taken to ensure accurate and trustworthy results. The holders were filled in absolute darkness, and the experiments made at night, when there was no possibility of light leaking in from a door or window casing. The holder was placed about eighteen inches from the red light and the slide drawn out one-fifth of its length, and the plate exposed to the light for one minute. This process was repeated at intervals of a minute, until the whole plate had been exposed, making a series of divisions which corresponded to a series of exposures running from one to five minutes. The plate was then flowed with hydroquinone developer, that being used on account of its being less likely to stain, or produce chemical fog, and after a careful development the five divisions were seen clearly marked upon the plate. Another plate was now taken from the holder, which was opened in the light of the lamp and placed in the tray. Less than a minute elapsed between the emptying of the holder and the immersion in the developer. The plate was allowed to remain twenty minutes in the uncovered tray, with only the developer as the screen from the light. When cleaned and washed there was just enough fog visible to destroy all hope of ever securing a negative from a plate treated under such conditions. The developing tray with the hydroquinone solution was next placed in a dark closet, and a plate which had been removed from the box in the dark, immersed in the developer, and allowed to remain there 20 minutes. I was still unsatisfied and wished to see whether the fog might not have been the result of the action of the developer, rather than of the red light. After the plate had been allowed to soak for this length of time it was transferred to the hypo and cleared. A fourth plate was then taken from the box and put into the hypo to clear. This was to secure a standard for comparison, for theoretically the plate which had been placed in the developer, but which had not been exposed to the light, should have been as clear as the plate which had simply been placed in the hypo. And such proved to be exactly the case; there was no difference discernible between them; they were both absolutely clear, and the one which had

been in the developer could not be distinguished from that which had been placed in the hypo. All the fog had been produced by the light of the red lamp.

In order then to preserve the absolute sensitiveness of a plate, it should see no light until the image is found upon the film by the lens. No red light is safe, and its employment in filling the holders will always introduce such an element of uncertainty into the operation, as to render it even more complicated than ever. The fog may not be very perceptible upon the plate, but if the holders are filled with the light from the red lamp streaming upon the table, and the box of plates permitted to remain uncovered, there will be a sufficient loss of sensitiveness in the plate to render it impossible to secure the best results. I do not mean to say that a red lamp will fog a plate so badly that it will be impossible to obtain a negative from it; but only to insist upon the fact, which is so generally overlooked, that it will materially affect its brilliancy. The negative will not have that silvery clearness in the shadows which is absolutely essential in order to procure a strong, plucky print. It will lack contrast, the half tones will suffer, and the whole picture be more or less dull and lifeless. It is especially imperative to keep this fact in prominence in doing detective work or in handling a plate of the sensitiveness of Carbutt's Eclipse No. 27. To fill holders in a dark room with the red light burning brightly and the box open, is only to court failure. The negatives will be devoid of that crispness and brilliancy which are necessary in order to obtain "plucky" prints.

The only safe rule to follow, is to fill the holders in the darkness, for after the exposure has been made in the camera, the plate has lost the greater part of its sensitive character. There is also a rapid decrease in sensitiveness as soon as the plate has been soaked and the developer begun to act. When the high lights have appeared there is really very little danger to be apprehended, and the operator can watch his plate from time to time in perfect security. If the holders are filled in the darkness—and it will require but a little practice to be able to do this—and the first light which strikes the plates be the light through the lens, there will be very little danger of fog, and the amateur will be surprised and delighted at the quality of his negatives. Since I have followed this rule, I have not lost a plate through fog. I have lost many of them, I readily grant; but

they were from other causes, overexposure, underexposure chemical fog, stain, mistakes in development, and soon. But I, have yet to see my first case of fog from light. While my note-book shows an abundance of failures, fog is not mentioned once. It vanished when the employment of the red light ceased, and I have in the field a delightful confidence and certainty as to the condition of my plate. If the perplexed amateur, who has been struggling with the fog problem, will follow this method, to fill his holders in the dark, and to use as little light as possible in development, I will guarantee him that he will very soon find that he has simplified his work very much, and that the fog fiend has left him.

THE CHEMISTRY OF PHOTOGRAPHY.

By Col. S. H. Lockett.

Photographing, or "Light drawing" is both a physical and a chemical process. It is physical, in that the chief agent in producing the results obtained is *light*, which is one of the well recognized physical forces of nature, as are also heat, electricity, magnetism and gravitation. These forces are called physical, because their actions do not produce permanent, constitutional changes in matter.

On the other hand *chemical affinity*, in its action, does produce marked and permanent changes in substances—changes which are made manifest in modifications of form, color, taste, structural condition and general properties. These latter changes are plainly observable in photography; we are therefore justified in saying that it is in part, at least, a chemical process.

The line of demarcation between the parts of the process which are physical and those which are chemical is so poorly defined, or rather they shade into each other so gradually, that the acutest analysis fails to determine just where one ends and the other begins. Hence, there is a wide diversity of views amongst scientists and practical operators in their attempts at explaining the phenomena of photography. The "why" or "wherefore" of many of the phenomena, no one, perhaps, is bold enough to try to give.

All agree, however, on some well established *facts*, which may be briefly stated:

1st. White light, and especially solar light, possesses a remarkable property called "Actinism" of *predisposing* certain substances to peculiar and extraordinary chemical activity.

2d. Of all the seven constituent colors of white light, viz., violet, indigo, blue, green, yellow, orange and red, violet is most and red is least endowed with this property of actinism.

3d. *Many* substances are susceptible to actinic activity—*some*, however, very much more so than others—and of all substances the various *salts of silver* seem to be pre-eminent in the enjoyment of that property.

4th. The *sensitiveness* of the salts of silver is much increased, and in some cases dependent upon a connection or combination with some *organic substance.*

5th. The *manifestation* of actinic effect may be simultaneous with the action of light, or it may be subsequeut to it; that is, the image formed may or may not be visible at first; if not, then it is revealed or *developed* by subsequent manipulations.

6th. The actinic effects of light must be preserved; that is, stopped at a certain point and prevented from going further, and there are certain chemicals which enable us to do this, which is called *fixing the image.*

From this category of facts we see that the essential materials of photography may be arranged under three general classes:

1. *Sensitive* or *impressionable* substances are those which receive and retain the actinic energy.

2. *Developers* are substances which make the actinic energy manifest by a visible image.

3. *Fixing solutions* are substances which preserve the image at any stage of the development desired.

There are other substances used called toning baths, intensifieds or their opposites, reducers, etc., yet, while they are of great importance to photography as a *fine art*, I have not classified them amongst the essentials. On this occasion no attempt to go into details or to elaborate the multitudinous manipulations of photographic operations will be made, only a simple effort to state clearly what takes place in each of the essential operations of the art.

1st. On exposing a sensitive plate or an impressionable substance to light, a *reducing action* takes place; that is, the light either has the immediate power or a *tendency* to diminish the

quantity of oxygen in certain oxides of the metals, and highly oxyginated salts and acids, as also the chlorine, bromine and iodine of certain chlorides, bromides and iodides of the metals.

This reducing action may produce a sub-oxide, sub-chloride, etc., or it may go so far as to effect a complete decomposition of the sensitive substance, resulting in a metallic deposition.

In either case the reducing action is made manifest by a change of color and the appearance of an image as final result.

2d. In case the immediate action of light is a *tendency* only, then a development of the image becomes necessary. The developers are all active absorbers of oxygen, bromine, chlorine and iodine, whether their constituents be organic or inorganic.

Under the influence of light, or of the *tendency* which has been superinduced in the sensitive substance by light, the oxygen, chlorine, bromine and iodine which leave the metallic compounds, combine with the hydrogen of the developer, and with the organic substance used as a vehicle for the sensitizer. In accordance with a well known law of chemistry the *reducing action* and the *combining action* above noted mutually facilitate each other, each being the promoting cause of the other.

3d. The process of fixing is simply the action of a solvent, which has no power to dissolve the reduced metal or subsalt which has been formed by the actions of the light and the developer, but does dissolve freely the unaffected salts of the sensitizer.

These three essential steps in photography we shall try to llustrate in order. But before doing so it may help us to clearer deas to recall some very familiar effects of light.

The ladies all know that sunlight fades their carpets and curtains, and many of the colored fabrics of which their dresses are made; it bleaches their straw hats and muslins, but unfortunately tans their fair faces and hands. It gives the vivid green to grass and foliage, and the beautiful colors to flowers and fruits; it influences the plumage of birds, scales of fishes and skins of wild animals, as it is well known that in tropical countries, where the sunlight is brightest and most direct, nature is lavish in clothing her creatures in raiment of brilliant colors.

But to come a little nearer to our subject. Take two jars, one containing hydrogen gas and one chlorine; mix them together

in a third jar, taking the precaution to do so in a room moderately dark. A simple mechanical mixture will result, and this mixture could be kept in a dark room almost indefinitely. But let a flash of sunlight fall upon the jar, and at once a sharp explosion takes place from the instantaneous union of the hydrogen and chlorine to form hydrochloric acid. Exactly what the light had to do with the matter the wisest chemist cannot tell you. In the hydrochloric acid there is no light; this mysterious agent in its flight of nearly 200,000 miles per second has simply passed through the transparent glass of the jar, has done its work and is gone forever. Nothing has been added, nothing taken away from the weight of the two original elements. The acid can be decomposed and the same volumes of gases are obtained. The active agent which brought about their combination has left no record of its work except in the results produced.

Very similar to this is the action of this same mysterious agent in photography which we hope to illustrate in the processes with which we are all familiar.

The sensitive dry plates we employ in our daily photographic work consists of an intimate mixture of bromide of silver with the organic substance gelatine, spread in a thin pellicle over a plate of glass.

When exposed in the camera no visible image appears, but there is a strong *tendency* set up in the bromide of silver to yield up a part of its bromine and form a lower salt of silver, or even to form a deposit of metallic silver among the organic particles of the gelatine.

This much of the action is purely physical. What the physicists call a molecular action; that is, the atoms rearrange themselves, but there is no actual decomposition.

When, however, the developer is poured over the plate the previous *tendency* to action becomes an active operation. The silver bromide is decomposed at all points where the plate has been affected by light, and in exact proportion to the luminous effect. Bromine is set free and metallic silver is deposited in minute particles in the gelatine pellicle, and at the same time the liberated bromine unites with the hydrogen of the developer to form hydrobromic acid. Other more complex chemical actions take place, depending upon the developer used, whether it be purely organic like gallic and pyrogallic acid, or hydroquinone, or inorganic as the ferrous oxalate solution. But the

main action is indicated above, namely, the decomposition of the silver salt, the deposition of the metallic and the recombination of the non-metallic elements.

The next step in the process is the *fixing* of the negative. This is done by the use of a strong solution of hyposulphite of soda, which dissolves very freely all of the silver bromide not acted upon by light, and does not attack the metallic deposition.

Other fixing agents are employed, as ammonia, and the chlorides of ammonium, potassium and sodium, but the giant among the fixers is undoubtedly our familiar old friend "hypo."

But "hypo" itself must be *fixed* so that it will do no harm to the result of our labors. This is done by copious washing, which is itself a semi-chemical process.

The next and last step, namely, the drying of the negative is a purely physical process.

In making a positive print from our negative the steps are very similar to those already just given, and the physical and chemical actions are but slightly different. These differences will be enumerated briefly, as the best method of indicating in a few words the chemistry of positive printing.

First a *visible image* is formed during the action of light. This results from the fact that the sensitizer of an albumenized, salted piece of paper which has been treated to a nitrate of silver bath contains all the elements of both the dry plate sensitizer and the developer combined. The chloride of silver is the impressionable agent; the excess of nitrate of silver and the organic albumen and paper constitute the developer. The reducing actions and combinations are similar to those already noted. Subsalts and metallic silver are deposited in the albumen and grain of the paper. Chlorine and hydrogen form hydrochloric acid; the sodium is oxydized to form soda, which unites with the nitric and hydrochloric acids to become freely soluble salts.

Washing with pure water will therefore do much towards taking away the unneeded materials of the positive print. But it will not take away all of the sensitive compound. Hence we must use a fixer in this operation, as in the making of a negative, and our old friend "hypo" again comes to our aid. But before we are ready for "hypo's" helping hand our print has to to be *toned* to give it a more pleasing color than the foxy red which would result from simple washing and fixing.

The most common toning bath is terchloride of gold mixed with a solution of salt and soda. The action in this case is a reduction of the terchloride of gold to metallic gold, which is deposited on the image already formed by the silver, while the liberated chlorine unites as before with the hydrogen which is found in the aqueous solution; the sodium of the salt is oxydized to soda, which unites with the acid and becomes as before a soluble salt. All the unneeded materials are washed out by the free use of water.

The process of intensification by the use of corrosive sublimate or bi-chloride of mercury is a process of converting the silver image into a double salt of silver and mercury, which is subseqnently reduced by ammonia or some other reducing agent, so that the image becomes thicker and denser from having the metallic silver reinforced by the metallic mercury. There are other intensifying processes in which the action is similar, though not exactly the same, but time will not permit us to notice them.

In reading one French, two English and one American authority on this intricate subject I find that no two of them agree with each other on many points. When doctors disagree a layman should be very chary of expressing his views. I trust that my feeble development of this subject will not too much expose my own ignorance, nor too much intensify disgust at my temerity in trying to handle it; but rather that criticisms will be toned by the pure gold of charity, and good opinion of me may be fixed by the thought that I have made an honest effort even if I have failed.

OVER-TIMED AND UNDER-DEVELOPED.

By E. Long.

On thinking over the beauties and the faults of the thousands of dry plate photographs sent us for solar enlargements, one error, or rather a double error, seems to preponderate.

First, over-timing and second under-developing. This does not apply to one picture or a dozen, but to many hundreds.

In my own landscape negatives made for recreation, I find the same combined fault, and am ashamed that I did not see it sooner.

We often hear the expression "What a boon the dry plate would be, with all its sensitiveness and keeping qualities, if we could only get the force, the snap, of the old wet plate." And just there it is, we loose the strength of both high light and shadow by over-timing and under-developing. We look at the beautiful detail in the deepest shadow and admire it; on the other hand we look at the exquisite modeling in the high lights and admire that also, but we get too much of it; we lose greatly in what I understand the painters to mean by *breadth*—and as our photographers are earnestly turning their attention to the production of more artistic work and are making rapid progess in that direction allow me to set this up as one milestone on the road to fortune and to fame. And if any are benefited by these ideas will they kindly drop me a card, or echo this in their favorite journal.

HYDROQUINONE AS A DEVELOPER FOR LANTERN PLATES AND PHOTO-LITHO NEGATIVES.

By Edward J. Lovejoy.

As my contribution this year to the ANNUAL, I have thought my experience with hydroquinone as a developer would be of interest. Being persuaded by a friend to give it a trial, I did so after a deal of argument for and against, as not being an advocate for chopping and changing about with developers. I did not like the idea of giving up my pyro and ammonia. However, I made a trial with the following formulæ, which I took from the *British Journal of Photography*, of Feb. 1st, 1889:

NO. 1 STOCK BOTTLE.

Hydroquinone	80 grains.
Sodium sulphite	1 ounce.
Citric acid	30 grains.
Ammonium bromide	10 grains.
Water to	10 ounces.

NO. 2 STOCK BOTTLE.

Carbonate potash	1 ounce.
Carb. soda (crystals)	1 ounce.
Water to	10 ounces.

Take equal quantities of each

So well did it answer, and so far did the result I obtained exceed my expectations, that I have never seen any reason to alter the formulæ in any way up to the present. My first experiment with it was on a 17x14 plate, which I subsequently found I had rather underexposed, but by continuing the development I got out all the detail, and without the slightest signs of staining or fog, and a more magnificent negative, it has never been my good fortune to get. I have taken some hundreds since, both large and small, with equally good results. This being the case I had no alternative but to use it in place of pyro and ammonia. I next tried what it would do with lantern plates and have made some of the best slides I have ever seen with it. It gives a warm blue-black tone, if used in the proportions given, and looks brilliant on the screen; but the tone may be varied considerably by using the developer in different proportions. Noticing that under certain conditions it had a tendency to give negatives with strong contrasts, and being rather slow in its action, I thought it might answer for taking negatives of line subjects, so I tried it on a Hawson photo-mechanical plate with the most satisfactory result, and being engaged in working the photo-mechanical processes, I am using it exclusively for that class of work. It also answers well for bromide papers, and I would strongly recommend those who have not already done so, to give it a trial.

HINTS IN PHOTOMICROGRAPHY.

By R. L. Maddox, M. D., Hon. Fellow, R. M. S., etc.

The admitted advantage which Photomicrography offers to the microscopist for recording the images seen under the microscope, tends, owing to the convenient use of the sensitized dry plate, to largely advance its employment for scientific and educational purposes. There are, however, two or three points which, from the present literature on the subject, as far as the writer can judge, are seldom alluded to or even hinted at. Therefore, it is the intention to make them the subject of a few brief remarks.

Much care is usually insisted on to secure all extraneous light from entering the camera at its junction with the microscope; yet the same attention is not usually directed to avoid the chance of reflected light from the sides of the

upper part of the draw tube of the microscope after the rays have traversed the object and objective. A very common plan, when the object has been duly arranged and centered on the stage, is to withdraw the eye piece and insert the eye end of the draw tube directly into the camera, making the junction secure from the entrance of all outside light.

The optician usually takes care that the inside of the draw tube shall be properly dead blackened, and this, if carried upwards beyond the distance that the lowest eye piece enters into the tube, quickly gets abraded by the constant interchange, insertion and withdrawal of the different eye pieces, leaving a more or less shining and reflecting surface at the ocular end. This now becomes the chance of serious interference with the most perfect definition of the negative image.

It is useful, therefore, to employ a velvet tube introduced into and occupying the entire length of the draw tube upon the removal of the eye piece. Also a dead blackened pierced card placed about 2 or 2½ inches in front of the sensitized plate enhances the brightness of the image. These pierced stops are easily made of blackened cardboard, the apertures being of such diameters as to regulate the size of the field according to the magnification or nature of the object. It is well to insert them in a carrier between two grooved uprights which are attached to a flat base that can slide to and fro by means of a guide, and a groove cut in the floor of the camera, so that they are readily made interchangeable and can be quickly brought nearer to the sensitized plate if required.

As an illustration of the value of these apparently trifling details, the following may be taken as an example: It was required for the purpose of an experiment to enlarge the junction aperture in the camera, and then on testing the centering when the microscope was placed in position and looking at the screen a bright ring nearly half an inch in diameter surrounded the central imaged aperture of the draw tube—no velvet tube had been inserted in the draw tube. On removing the screen or focusing glass and looking into the camera, light was seen reflected from the inside of the tube for the entire space the eye piece entered when in position. The ring of reflected light was immediately destroyed on inserting a velvet tube into the draw tube.

An easy plan to make such a tube may, perhaps, be stated, without largely encroaching on the pages of the ANNUAL.

Procure a wooden roller that will enter the draw tube and leave about one-twelfth of an inch clear all round. Roll round the roller a couple of turns of tissue paper and gum down the free edge. Cut a piece of cartridge paper so that when rolled up it shall fit the draw tube easily. It is as well to cut this paper rather obliquely where the sides will meet when closed, so that the seam may be slanting. Smear the paper on one side with glue or paste and place on it a piece of velvet, pile side up, cut a very trifle smaller. Before this is dry, roll the velvet on the roller and glue a thin strip of paper over the oblique seam.

Allow all to dry on the wooden roller. Although it will contract somewhat on drying, it and the tissue paper lining which has not been fixed to the roller can be easily removed, and when inserted into the draw tube should be carefully and sharply trimmed to its exact length. When not in use it is as well to slip it on the roller to keep its figure. Another plan is to have a brass tube, rather longer than the length of the longest eye piece, which must be dead blackened on the inside; this is easily inserted into the draw tube, which it should fit very smoothly, and can be easily removed when the ocular is to be used. A narrow milled rim round the outer edge would assist this manipulation, and not interfere when the camera tube is inserted into it, but in this case the bore of the tube, if not of greater diameter than what is generally given to the draw tube might, when the camera is fully extended, too much contract the field.

It is as well not to have an absolutely rigid junction between the camera and microscope, so as to lessen the risk of vibration, and it must be taken from the above, that in no parts in the course of the rays towards the sensitized plate, whatever the method of vision adopted, should there be the least chance of reflected light from any part of the apparatus.

When using low powers there is also some advantage gained by slipping a short, easy fitting velvet tube on the nose of the objective and letting it rest on the object slide, so that the image may be formed entirely by transmitted light, while surface reflected light will be avoided.

These trifling hints may possibly assist those who have not given them the attention they deserve.

HINTS TO PHOTOGRAPHIC TOURISTS.

By George Mansfield.

I can imagine nothing more delightful to the lovers of photography than a tour with his camera, either at home or abroad, amidst beautiful scenery and interesting monuments, for the *sole* purpose of obtaining transcripts of the beauties which nature so lavishly places at the disposal of those who have the artistic instinct to reproduce them. I purposely underline the word *sole*, as I know how different and how disappointing is an excursion, where the photographer seeks to combine several ends, and takes with him his family or other more photographic friends. He is taken to places where he knows there is no food for his camera, he is hurried in the very places where patience and waiting are required to secure a well lit picture; in fine, his temper is constantly tried, and the results are photographically and artistically low. The hints, therefore, that I propose to give, and which a long experience has taught me, are destined for the photographer, who is starting on a trip devoted entirely to photography, his aim being to obtain not so much a large number of pictures as really good ones. I must confess that if one can have with one, on such an excursion, a trusted photographic friend, it is not only an advantage socially, but also in many cases a great mutual help; especially should one's work lay in towns or populated districts, where the intervention of some one to keep the crowd at bay, and protect the apparatus from their praiseworthy but inconvenient curiosity is almost a necessity. As the end prepared is or ought to be to obtain the best possible pictures, I strongly recommend the tourist not to be frightened by the fatigue entailed by heavy apparatus, but to boldly adopt a large size plate. It will be, no doubt, sometimes a heavy grind to drag a 10x12 or 12x15 camera up a hill under a blazing sun, but the resulting picture will give you much more enjoyment than one on a half plate.

I would, however, advise the tourist never to hesitate to employ a man or boy to assist him to carry his apparatus, if he has to walk any distance, the little extra expense pays well, as one is scarcely in the best frame of mind to select a view when hot and tired out. The recent advances in photography have made matters much easier for the peripatetic photographer, paper and roller slides, and now films possessing all the advantages of glass,

without any of its drawbacks, have done much to lighten his burden. Nor is the weight taken off his back only, his mind is equally relieved from its constant dread of seeing his many dozen glass plates rendered useless by the clumsiness of a porter or the inquisitiveness of a custom-house official, to whom these heavy boxes always appear suspicious.

Before starting on any excursion of importance, it is necessary to see that every part of the apparatus is in perfect order; look well over the dark slides and the camera, as the smallest opening will fog a sensitive plate. Select lenses of various focal lengths, so as to be in position to fill your plate with exactly the amount of views that give the best balanced picture. Be thoroughly conversant with the rapidity of your lenses and with their different stops; this is next in importance to thoroughly knowing the plates you use ; experiments with new lenses and new brands of plates must be made, not during an excursion, but before, if you do not wish to meet with disastrous results in toning your exposures.

A few duplicate screws for camera and tripod head, as well as some simple tools, a bottle of glue and some putty will be of much use in case of accidents. I cannot, however, recommend taking dishes and chemicals for developing, even an experimental plate, as it entails much fatigue and trouble, and should be quite unnecessary if the photographer has had a fair experience with the plates he is using. He will find it quite enough to have to change his plates in the evening after his day's work, but this is far better done in the evening than during the day, as it is often hard to exclude the light, particularly with foreign doors and windows. Never neglect to dust your plates before putting them into the slides and on taking them out, and pin a numbered label on the back, so that on referring to your note book you can afrwards tell what pictures you are developing.

Should time permit, it is most advantageous to be able to go over beforehand the ground where you intend to photograph. Very often, on arriving at a place in the afternoon, it is too late to start out with your camera, the time may, however, be most usefully employed in laying out, *compass in hand,* the work for the morrow, for nearly every landscape and building depends, in a great measure, on correct lighting to produce a satisfactory picture in its camera. If your plates are rapid enough, take advantage of any figure or animals that may give life to your

picture, but if your plates are slow or the subject has much deep shadow or heavy foliage, avoid any figure that you cannot trust to stay still for several seconds. On a windy day, with moving foliage, rapidity is again a decided advantage in a landscape plate. With a slow plate it is better under the circumstances to leave the trees alone, as under exposed foliage is the weak point in half the landscape work one sees. Early in the morning and in the evening there is generally less wind than in the middle of the day, but do not forget that at these times the light is much less actinic. Use a fairly large stop, but get everything in good focus, its foreground the sharpest, the distance gradually less so as in nature, but do not let any one pursuade you that blurred and indistinct definition in any part of the picture is *artistic effect.* Let technical excellence and careful manipulation go hand in hand with artistic taste and knowledge, if you wish to get pictures worth looking at when your tour comes to an end. Lastly, if you use glass plates, never let the boxes containing them out of your sight or you will probably return with broken glass instead of negatives.

"THE STORY OF A CAMERA CLUB."

By "Marco."

In a small city, not more than a thousand miles from New York, a few individuals who had become enthusiastic in the facinations of amateur photography, organized a camera club with the usual object of exchange of ideas, comparison of results, etc., and in due course decided to have club rooms. After no little effort a very pleasant and attactive suite of rooms was secured and the club moved in. The dark room was considered to be of minor importance and was merely put into such condition that a plate might possibly be developed if the member had unlimited patience and no small amount of skill and judgment, but inasmuch as every individual had a much better place at home, the club dark room was seldom used. A regular weekly meeting was held when a few members dropped in and occasional lantern slide exhibitions were made with a lantern which belonged to one of the officers of the club. So the orginization lived and had a being for nearly, if not quite, two years. By this time it became evident that as a club it was a poor success

and the members were called upon to decide whether to endeavor by some means to awaken the declining interest or to abandon the idea as a failure. The club had certainly not gained in any way for a long time; attendance at meetings was very thin and growing thinner. No one could be found in the rooms except on meeting nights and the outlook was anything but encouraging. In the meantime the number of amateurs in the city had largely increased and was constantly growing. After some consideration on the part of a committee appointed for the purpose, a decided change was recommended, approved, and the work began. New quarters were secured, in which the dark room was made the main point and all other things considered as of secondary importance. The dark room was provided with electric lights, with screens of various colors, long sinks, several water taps, lockers, in which each member can store his kit, and in fact as perfect in all respects as any one could desire. The club bought an enlarging apparatus and arranged for making lantern slides. A good lantern was also purchased. All of the leading photographic journals were to be found on the table, and in fact everything was done to give the member value received for his investment and to make the membership so desirable that no amateur or professional in the city could afford to be a non-member. Now for the results. In three months the membership had doubled and every meeting finds several names on the bulletin. One can hardly go into the rooms at any time of day or evening without finding several members at work. Demonstrations of photographic progress are frequent and interesting, and the enthusiasm constantly increasing. Now the moral of all this is evident. To make a camera club a success, provide your members with facilities so much better than they can possibly enjoy at home that the club room becomes fascinating as a perfect work room and you need have no fears of failure. Of course, the work room is the main point, but there are others which interest and amuse. The walls bear evidence of meritorious work, and prints are selected for this purpose, from the best of those submitted. But the albumns on the tables are the curiosity shops, for in them are placed the odd, grotesque and interesting things from all parts of the world, and many an amusing and profitable hour can be passed in looking through them. No country has escaped the camera of some member or his friends,

and the stories told and thus graphically illustrated afford no end of entertainment. The transition from a rapidly approaching expiration to a state of health and vigor beyond the hope of any, has been so sudden and pleasing that it forms the subject of many a talk and not a few jokes—to say nothing of the standard toast—"The Camera Club, long may it live and never grow less."

PHOTOGRAPHIC MOUNTS—WHAT TO AVOID.

By George Mason.

During the currency of this last year there has been considerable stir amongst the theorists in the profession, regarding mounts and mounting boards, in connection with the deleterious effects that many manufactures of these have upon the silver prints—I say theorists, for the practical photographers, as a body, do not take any part in the general hubbub—and why¿ Because the facts in most of the cases are not as represented by the men who write so much, and know so little. It is conveyed by one and all of them, that there are so many bad mounts introduced into the market now, that they feel it a duty to warn the poor photographist.

The real state of the case being, however, that, out of all the millions of mounts that are used yearly, those not perfectly good and suitable for use do not cover the twentieth part of a single per cent., and even in such isolated cases, the photographer knows quite well (certainly in four cases out of five), when he is ordering, that he is ordering a risky thing; but it looks pretty, and he ventures it, and this in spite of the persistent cautions given, both by the photographic press and dealers.

There have been no end of pages written and advices given on this subject, which, when boiled down, can be put into very small space indeed. I would say to the photographer avoid all chocolate enamel mounting boards, also every form of bronze metal printing; if you banish these, most of your troubles will cease.

All dark colors in bevel edged mounts are much sought after, and the pigments from which the black and olive green enamels are produced have, in my experience, always been found perfectly safe for the silver print. Sometimes, when mounting

with a thin paste, the color lifts a little, but to obviate this, the following method of mounting will prove a cure: Use common starch for preparing the mountant; this must be stiff and not of a watery character. Paste the print, not the card, equally all over; this latter is of great importance. After the photos have been mounted, the cards must be dried in a warm room, say 70° F. All this is necessary to prevent the mountant from dissolving the color of the enamel, which would take place if the starch was watery. It is generally understood that the mountant is always used fresh.

But all these dark colors, so much favored by the profession, have been introduced with bristol surfaces, and have been found quite reliable, the color in this class of mount being perfectly fixed.

To return to the subject of bronze (bands) and printing, however, this really is the great source of evil by which silver prints suffer most, and it ought to be discarded by all who value the permanency of their work.

PHOTOGRAPHIC FOREGROUNDS.

By G. G. Mitchell.

A great want in photographic landscape work, generally speaking, is picturesque effect. It is needless to remark that there are many conspicuous exceptions. We have all seen and admired them, and have done so all the more that they were *photographs.* Had the pictures been simply drawings, or clever hand transcripts of nature, our admiration might be none the less real; but it would not have that element of surprise in it which the artistic photograph evokes. Because we are not commonly accustomed to photographs which are *just like pictures,* we therefore do not always expect picturesqueness, and when the exception meets our eye we are instinctively compelled to exclaim, "How like a picture!"

It is impossible in many cases, and usually very difficult, to photograph a view exactly as we could wish. To give a fair and recognizable representation of a scene, it is often necessary to take a standpoint within very narrow limits, and these may be precisely the most unfavorable to picturesque treatment. The great license which the hand artist enjoys is denied to the photographer.

He cannot at will put his subject in a charming foreground setting. He can, indeed, do much on occasions when the situation will permit; but at others, all accessories and helps are absent, and nothing remains but to take the "pot boiler" in all its homely and unadorned condition. In such a case the only aid to artistic effect left, and it may be a great one, if intelligently used, is to wait on the best light, and most effective fall of the shadows, which may redeem the work from utter vacuity of pictorial interest. Now, may not the photographer enjoy the privilege of a little license in the matter of foregrounds, introduced by the resources of his art, or by possible composition in physical objects? Of course, very bad taste may be shown in attempting expedients of this sort; but, on the contrary, very good effects may be produced. It is manifest that if materials are not at hand and available in any particular instance, recourse may be had to double printing. When I speak of materials for foreground composition, I mean principally foliage. A broken branch, and the bigger it is the better, will be found very useful. An assistant or friend also to hold it, or fix it in as natural a manner as possible, which may not be so easy as at first sight it looks, for nature has her own ways of putting things, and these are not so easily imitated even with her own properties. Then, again, there are loose sticks and stones and débris of various sorts now and then to be had, which are welcome. In this kind of composition, it is necessary to keep looking at the progress of the work, either through the camera, or, better still, through a view meter. I much prefer the latter, because the view is now reversed and better judged of. There is some hard work in all this, but the result repays the trouble expended, if well done. Not only is foliage useful in the way I have indicated, but it is especially so in the screening out of the unsightly features in a composition. You see a good picture, but make a wry face at some ungainly spot or other in it. Here a branch may come in with the most grateful service.

Now, is all this legitimate? I think it is, but our artist friends will likely ogle at it, and speak fine flowing things about truth and honesty of representation, of which they know so much and to which they are so devoted. Well, we must take a humble place, and own that nature is tampered with a little; but our only plea is that it is in the interest of the picturesque, and that

is a strong plea. I don't think that painters need throw stones here.

A bit of water will come sometimes just in front of our standpoint which is tame and prosaic; whereas, if we could only move a few yards up or down stream, we could get lovely boulders and bushes, but we cannot move. The view must be taken from this spot or suffer much in consequence. Do your best in such a case to bring as much débris and stones as you can to break up the too smooth flow of that placid stream, and so stir it up to brawling pitch if possible.

Now, this is one way of helping the picture. I will refer to the other which I have already alluded to—double printing. No doubt it is more trouble, and the whole question is, is it an improvement that will pay? Is the play worth the candle? I think it may be worth a deal more in instances, and since we are conversant with printing in skies, the whole difficulty is understood aud appreciated. It will be more now and less again, and nearly always easier than putting in skies, or at least as easy. Certainly there would not be the same delicate parts to cope with, such as horizons, church spires, and so on.

A good general foreground without very marked characteristics, and admitting of easy manipulation might be adapted to views which stand greatly in need of it, when the extra work would pay, for that consideration must rule.

A sky, whatever might be its character, will never be objected to as a feature not known in a particular locality, unless it exhibited a sunset in the wrong place; but a foreground might come in for this kind of criticism, and rightly so, if it was overdone; but on the supposition that it is not too marked, it might pass the most fastidious inhabitant and stickler for literality and be accepted as part of the actual view. Very few take a picture in their hands and go out to seek the precise spot it was taken from. I do not see why this double printing should not, if well managed, be as pleasing and artistic as a well adapted sky, nor the actual composition of natural objects either, all objections from the literalists notwithstanding.

The foreground has a very important part to play in the successful composition of a picture and it is just there where a photograph otherwise good, often conspicuously and miserably fails, but not, I think, without remedy.

THE EMPLOYMENT OF THE OPTICAL GLASSES RECENTLY MANUFACTURED IN JENA FOR PHOTOGRAPHIC LENSES.

By A. Miethe, Potsdam, Prussia.

As is generally known, an undertaking has within the last few years been set on foot in Jena under the direction of Prof. Abbe, which has for its object the scientific manufacture of optical glasses with regard to the advancement of practical optics.

The chief object to be attained was the removal or diminution of the secondary color-aberration; at the same time the successful attempt was made to vary the optical qualities of the glass-fluids by introducing into them new elements. The relation between the refraction-index and the dispersion, which previously in almost all cases had been a linear function of the first contant, was principally kept in mind and glasses were produced, which showed with almost the same refraction-index very different dispersions. By this means it is possible to correct spherical aberration in the construction of telescopic and microscopic objectives, in large measure independently by chromatic errors and in general to satisfy one more condition than formerly in the construction of optical lenses.

It is evident that great advantage may be taken of this fact in the case of photographic lenses, and I have endeavored to follow this out mathematically. I had first to decide what new condition needed most carefully to be fulfilled. The secondary spectrum and the remains of spherical aberration on the axis seemed to me to require no more correction than the distortion of the field, therefore I made the attempt to fulfil a wholly new and hitherto only occasionally mentioned condition: the diminution of the astigmatism of the heteronomic pencils.

Astigmatism Heteronomic.—It is well known that the diminution in sharpness from the middle of the picture towards the edges is essentially due to astigmatism, and this defect has theretofore been supposed to be irremediable. I will not describe the process—more tedious than difficult—by which I found the analytical conditions of astigmatism. Suffice to say that I succeeded in thoroughly removing the serious defect by the use of suitable glasses, and in giving the formula of an objective which, resembling a symmetrical lens is wholly anastigmatic.

Anastigmatic distortion.—Apart from the last traces of distortion which cannot be removed, the lens—as was to be expected—showed the edge and center of the field with equal sharpness, even with full aperture. I may also add, that in the case of the new lenses the flint has a smaller index of refraction than the crown, and that the lenses have the merit of being especially thin—a fact which secures an unusually great rapidity.

Two forms of lens have been up till now made according to this method. The first is a symmetrically lens of $\frac{1}{6.3}$ equivalent aperture, which gives a correct image of 50° without a diaphragm and with the smallest stop a field of 90°. These lenses are specially adapted for portraits, groups and instantaneous work, and can be used with great advantage in detective cameras, where rapidity and sharpness at the edges of the field are necessary. In this respect they are vastly superior to all other forms of lens. A lens of 3 inches focus covers a plate of 2½x3 inches.

The second form consists of a simple landscape lens. It has an equivalent aperture of $\frac{1}{18}$, and gives, when sufficiently stopped down, a sharply defined field of 100°. This construction is particularly suitable for landscapes, and works very clearly and sharply.

So far both forms have been manufactured only in small dimensions and focal lengths, since the production and melting of suitable crown glasses of more than 2 inches diameter have been attended with difficulties. It is to be hoped, however, that these difficulties wlll be removed and instruments be produced of any desired dimension.

The largest symmetrical lenses have a diameter of 2 inches and a focal length of 6.5 inches, and work a plate of 5x7 inches. The largest rectilinear landscape lenses have 14 inches focal length and work a plate of 30 inches; they are thus adapted in landscapes for the largest plates.

"*Anastigmat.*"—It may be added that the symmetrical lenses, which have received the name "Anastigmat," are not essentially dearer than ordinary glasses of equal size, while the landscape-lenses are very cheap.

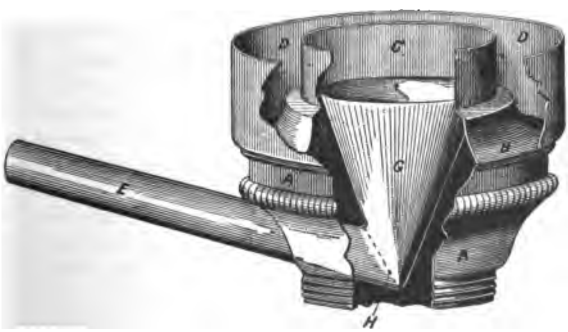
Hartnack.—The optical manufactory of Prof. Dr. Hartnack, in Potsdam, 309 Waisenstrasse, has undertaken the construction and delivery of the new lenses.

MAGNESIUM FLASH LAMP.

By Manly Miles, M. D., F. R. M. S., Lansing, Mich.

The frequent references to the magnesium flash light in the literature of photography, and the many new devices for burning magnesium are indications that it is rapidly gaining in popular favor and assuming a practical importance in the art that will soon make provisions for its use an essential part of every photographic outfit.

In the evolution of the magnesium lamp it will be admitted that progress must be made in the direction of simplicity, convenience and efficiency. As a contribution to the improvements that are now being made on these lines, the readers of the INTERNATIONAL ANNUAL are here presented with the outcome of my experiments in lamp making. But one-half dozen of these lamps have as yet been made, for presentation to friends, and these, aside from two hours of my own work, have cost me thirty cents apiece, exclusive of the rubber tube and bulb.



The following description will enable any one who has a little mechanical ingenuity to make his own lamp at a merely nominal expense for materials. At the crockery and lamp stores may be found "adapters" for putting large burners on small kerosene lamps, and *vice versa,* which have been made use of in the construction of this lamp, giving it its present form. The adapter, $1\frac{7}{8}$ inches in diameter, marked A, A, in the cut, forming the body of the lamp, has three holes punched in the sides, each about $\frac{3}{8}$ of an inch in diameter. One of these to receive the tube E, and the others, one on each side, to admit air for the center draught of the flame, not shown in the cut.

The conical cup G, the reservoir for the powdered magnesium, about $1\frac{1}{4}$ inches deep, and 1 inch in diameter at the top, is soldered to the end of the tube E, which is likewise soldered to the adapter A, as shown in the cut, so that the cone is in proper position in the center. The air passage from the tube E to the conical cup is a small hole (less than $\frac{1}{16}$ of an inch) at the point marked H. This is an important point in construction. If the tube E opens full size into the conical cup, but a part of the magnesium will be blown out of the reservoir by the jet of air, and it will not all be burned.

The second adapter, marked B in the cut, is practically a metallic ring which screws into the top of the adapter A. To the outer and inner edges of B, strips of sheet copper, D and C ($\frac{5}{8}$ of an inch wide), are soldered to form a circular trough to hold the wicks and alcohol. When this is screwed in place there should be a narrow space between the inner rim of the trough and the top of the conical cup for the center draught of the flame. The top of the conical cup should also be about one-fourth of an inch below the top of the circular trough for alcohol.

The addition of about six inches of rubber tube to the tube E, with a rubber bulb at the end, and a base of wood, about 1 inch thick and 3 inches in diameter, into which the adapter A is screwed, make the lamp complete. The hole in the base of wood should only be deep enough to receive the thread of the screw on A, as will appear from what follows.

The most satisfactory form of wick has been alternate concentric rings of lamp wick one-fourth and one-half inch wide, respectively. The one-fourth inch wick forming the inner circle, then a half inch, and then again a one-fourth inch, etc., so that the finished wick consists of three rings one-fourth inch wide, and two rings one-half inch wide, which gives an uneven surface at the top and gives the best flame.

Before adjusting the camera pour alcohol on the wick until it is saturated, care being taken that it does not run over on the outside of the trough; then put from 5 to 15 grains of powdered magnesium in the conical cup, according to the volume of light required, and the lamp is ready for use. When the camera is in place light the alcohol, remove the cap from the lens, and hold the lamp so that the flash will not strike directly on the lens, a little above and behind the camera will usually be best, compress the bulb suddenly and firmly and the exposure is made.

The small hole in the bottom of the conical cup, communicating with the tube E, constricts the current of air when the bulb is compressed and there is an inrush of the flame on all sides to the bottom of the cup like a blowpipe jet, which aids in the complete combustion of the magnesium. This may be seen by compressing the bulb when the alcohol is lighted without the charge of magnesium.

The weak point of the lamp, as at present constructed, is the danger of unsoldering its parts by this down rush of the flame if too often repeated. In ordinary use this cannot, however, occur, if the lamp is blown out, or extinguished by a metal cap as soon as the exposure is made, as the lamp will cool before the camera is again ready for another exposure.

If the hole into which the lamp is screwed is made entirely through the wooden base, the hand may be burned by the descending jet of flame.

The entire lamp, with wooden base and rubber tube, weighs but seven ounces, which is all that can be asked for on the score of portability.

HYDROQUINONE.

By Hen. R. Moiser, F. G. S.

Hydroquinone, or more shortly quinol, will be the developer of the future. It is somewhat strange that it should be from France and Germany, where the ferrous oxalate developer gave clear, bright, sparkling negatives, that the vigorous diffusion of this comparatively new reducing agent should emanate, while this country, to which it owes its application to photographic purposes, should be somewhat tardy in acknowledging its undoubted merits. Its advantages over alkaline pyro are many and great. To the tyro in photography it minimizes failures incidental to errors of exposure, as the latitude of exposure allowable, is sufficient to cover all risks of an under exposed plate in future. With quinol, a plate which has received ten times the correct exposure, can be made into as good a negative as another which has been correctly timed. This developer is clean and imparts no stain either to the gelatine film, the fingers, or the towel. In solution it will retain its power any reasonable length of time, say two or three months, and it acts upon the different parts of

the negative with force proportionate to the action of the light waves; thus giving true values in the various planes of the picture. Development completed, it is quite unnecessary to use any clearing bath, but, having washed the negative under the tap, pass it at once into the fixing solution. To allow for the requirements of negatives of flat subjects, as well as of subjects presenting strong contrasts of light and shadow, I make up two bottles of developer, and when one bottle is weakened by repeated use, it is strengthened by the addition of solution from the unused bottle, so that by the judicious admixture of these two solutions, all the exigencies of diverse character of subject can be satisfied. For instantaneous exposures this developer cannot be excelled; for lantern slides and positive prints on bromide or alpha paper, it is all that can be desired.

Opinions differ as to the use of the alkali in the form of carbonate or hydrate; the latter is more speedy in its action, and having tried various admixtures, I prefer to use caustic potash or caustic soda.

Published formulæ are innumerable—I append three, any one of which will be found to give excellent results. Quinol development once mastered, I venture to submit that few will return to alkaline pyro.

(1.)	Quinol	3 grains.
	Sulphite of soda	24 grains.
	Caustic soda	5 grains.
	Bromide of potassium	½ grain.
	Water	1 ounce.
(2.)	Quinol	2 grains.
	Citric acid	¼ grain.
	Sulphite of soda	6 grains.
	Caustic potash	4 grains.
	Bromide of potassium	¼ grain.
	Water	1 ounce.

This formula is recommended by Mr. J. W. Swan, M.A., and I can bear testimony to its good qualities.

(3.)	Quinol	2 grains.
	Carbonate of soda	20 grains.
	Sulphite of soda	18 grains.
	Water	1 ounce.

This formula is advocated by M. Mercier, of Paris.

A VALUABLE ACCESSORY TO AMATEUR PHOTOGRAPHY.

By William K. Newton, Paterson, N. J.

Having dallied with our very attractive art since the early days of tintypes, and having followed the rapid advances of more recent years, the writer can, without much egotism, accept the invitation to contribute something to the pages of the Annual.

In casting about for a topic my remembrance of a remark made by an older amateur seemed to take prominence as a sort of text. While looking over the work of the aforesaid old amateur—one who had weathered the storms of the wet plate days—I congratulated him on the wonderful success of his endeavors. He smiled at my compliments and asked if I had not yet learned to use the most valuable of accessories to amateur photography? Upon requesting further information concerning this accessory, as yet unknown to me, he remarked that it was a very common and useful article to be found in all households, yet never pictured in the catalogues of stock dealers, and never, to his knowledge, offered for sale by the latter class of merchants, "and," he added, "in all my experience I have found this article to be the one most used by amateurs and the one I have always employed as a receptacle for poor and imperfect results, and," he continued "this most useful friend to the amateur is the family ash barrel." Then he explained that the reason he had no poor work to exhibit was because he never kept a bad negative and never exhibited an unsuccessful result; but as soon as he ascertained that the result was unsatisfactory it was deposited in the amateur's friend, the ash barrel, and in a much mutilated condition. I have strictly followed his advice since that interview and never preserve or exhibit poor results, but discharge them immediatety into the amateur's accessory.

It is quite interesting to look back and think over the many causes calling for the use of this receptacle, and I have jotted down a few that now recur to me:

First.—I find that playing with strange and unknown plates is a very frequent cause for using the accessory; hence, I would advise all amateurs to confine their attention to plates made by old and reliable makers, and, if possible, to use one made with an emulsion quite uniform in time and composition. It does not pay, except for experimental work, to buy plates of many

makers. Select one brand of plates, study the results to be obtained therefrom and stick to that brand. If one purchases plates of different makes and of different sensitiveness and uses them indiscriminately, it is quite certain that the family ash barrel will often be called on to absorb the results. Another point, as the prices of plates of a given size are the same for all reliable brands no money can be saved by changing; and if plates are offered at prices below the trade list it is evident that something is wrong.

Second.—Frequent changes of the formulæ of the developer are helps to fill the barrel. If one is to make up his developer according to the formula given by different authors there will be no time for anything else, and he will have his shelves littered up with odds and ends of bottles containing all combinations that are possible with the ingredients. My advice is to fix on a simple formula and stick to it, for all that can be obtained from a plate can be had by the use of a developer of uncomplicated proportions and ingredients. Better is the developer made up on the decimal system, for then one can easily calculate the amount of the active ingredient in a given volume. Beware of the shotgun hit-or-miss formula that contains a little of everything fired together without any idea except to complicate the composition and dazzle the amateur.

Third.—To avoid filling the barrel use a weak developer. The use of rapid plates has caused many to believe that rapid development is a proper accompaniment. The reverse is probably true, for rapid exposures should have slow development. Hence, if one get into the habit of employing a weak developer and taking time with the development the results will be more satisfactory and the amateur's accessory will be less frequently used. I find that a light tight box large enough to contain the tray, in which is the plate, is a great help. The rapidly exposed plate is a great help. The rapidly exposed plate is covered with a very weak solution of the developer, then the tray is placed in the light tight box properly covered up and allowed to "simmer" for a half or three-quarters of an hour while the operator attends to other matters.

Fourth.—The amateur's accessory is very often called into play because too rapid plates are used. So common is the demand for extremely rapid plates that it is difficult to obtain slow ones. Now, I am certain that the best plate for an amateur is not a

rapid one, for the finest work in landscape photography is done with slow emulsions. Ordinarily the amateur has little use for lightning plates, for his work requires time exposure. Of course, it is very attractive to be able to photograph the hind legs of a mule when in the act of kicking, or to take the Chicago Limited Express while on the fly; but this sort of thing is overdone and is not artistic photography. A pretty scene taken on a slow plate and then developed slowly has more of the artistic about it than anything else in our line.

The uses for the amateur's accessory might be still more outlined, but I have mentioned enough to draw attention to its place in our laboratories, and might suggest, in closing, that perhaps the editor will consign this article to the same limbo.

SOME CONTRIBUTIONS ON PHOTOGRAPHY WITH COLOR PLATES.

By E. Obernetter, Munich, Bavaria.

Continued experiments by our experts in regard to the action of newly produced coal-tar coloring matters upon our gelatine dry plates have developed results which are indeed astonishing. We have, at the present time, coloring matters which are the cause of great changes in iodide and bromide of silver emulsions with and without an addition of ammonia silver. A great many of the same, to be sure, are of a rather detrimental consequence in their results, if not correctly applied. I myself have experimented a good deal with the following coloring matters:

Eosin (yellow), eosin (blue), erythrosin, cyanin and besides these the less known rose Bengal, uranine, safranine, methylene blue, etc.

Above all it is very disagreeable for professionals that the before mentioned coloring matters are produced with different modifications in every chemical factory. In Germany we have a number of very good establishments in this branch, and from comparison made by me I find that the chemical factory of Theodor Schuchardt, in Gorlitz, furnishes the most uniform article.

The eosin coloring matters deviate most of all in color; less the erythrosin. The latter I prefer to all other kinds. An addition of cyanin (blue) is frequently recommended to obtain

more sensitiveness for red rays. But the plates produced with the same show two disadvantages; first very little durability and secondly, the cyanin, as known, is a very changeable coloring matter, itself bleaching very quickly in the light. The erythrosin silver compound has at the present time the most extended one for orthochromatic purposes. A great number of compositions of the same exist, which give more or less good results, but all attain about the same thing.

Erythrosin dissolved in a certain proportion (about 1 grm. erythrosin, 200 distilled water, 300 alcohol, to which add 20 ozs. of a silver solution, 1:50 water) gives the well known coloration of erythrosin silver, which is dissolved carefully by addition of ammonia and applied with a little surplus of ammonia.

But now to the preparation of the gelatine plates. Of the three kinds, flowing, bathing and putting into the emulsion before flowing, the first named is to me the most suitable one.

This is decidedly proven by my observations and the tests I have made.

Why is it now that the plates are bathed in coloring matter? Only to economize at the expense of action and result. It is just so with the plates colored in the emulsion. In my establishment every portrait is produced to-day by flowing with coloring matter. The manipulation is as follows: The gelatine plate is well rinsed with ordinary water under a strong stream, and the erythrosin coloring matter is poured upon the same from all four edges in a dark ruby light; the discharged water is not used any more and poured out; the expense of the solution is very moderate. Now there are two ways possible: to either expose the plate wet, or to place the same upon filter paper and let it dry for use on the following day.

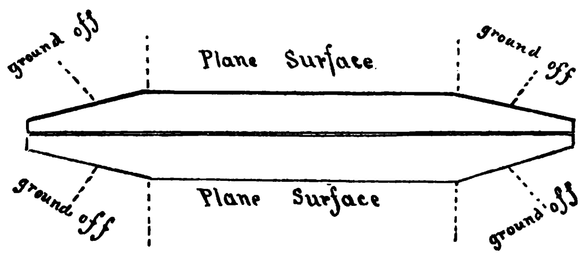
The former offers some difficulty in focusing, as regard must be had to sharpness in consideration of the swelling of the gelatine film; the latter I prefer, because, besides absolute sharpness, the sensitiveness is considerably increased in a dry state. I produce in this way stock plates for outdoor views as well as for the current orders in my reproduction establishment, for Lichtdruck and for helio-engraving. The plates will keep for about four months, which might be sufficient for most cases. But the emulsion plays by far the greatest part.

The plates bought in market contain generally too much gelatine and not enough silver, and to make glue color sensitive

without silver cannot be accomplished yet at the present day.

An emulsion containing the least quantity of gelatine gives undoubtedly the best results, so that the application of a filter of rays (a yellow glass) can be dispensed with.

For the latter I have made a very practical arrangement, which I will describe here. A polished glass plate is flowed with anrantia yellow collodion in several layers, according to requirement, also bichromate of potassium, and upon this is fastened a protective glass plate. To fasten I apply Canada balsam. This, after drying, I ordered polished in the establishment of G. A. Steinheil, as shown in the annexed diagram :



The plates are ground off at both ends, and are perfectly plain in the middle. For this glass I have a brass mounting, which can be inserted in the objective directly behind the diaphragm, exactly into the slit for the same. A whole series of such plates I have always ready for use, in all possible color tones. As developer for the exposed plates I apply either pyro or hydroquinone. With oxalate of iron richly silvered plates will easily harden too much and become too strong. Last summer I took a number of parallel views, and shall always be pleased to send copies of them to professionals who take an interest in this matter, knowing decidedly that tests with self-produced plates will be less frequently made than with the color plates, which can so easily be procured in market.

SACCHARATE OF LIME DEVELOPER.

By W. E. Partridge.

Lime, as an alkali for use in the pyro developer, was suggested six or seven years since. One of the first who proposed it was

Mr. Joshua Smith, of Chicago. In one of his papers on the subject, he said he hoped he had found "the missing link," and that lime would prove to be the alkali of all others for dry plate development. Very few persons used it, and after some discussion in the newspapers, it was pointed out that on account of the insolubility of the lime, a developer in which it was used as the alkaline element, must of necessity be weak.

At that time everyone was working for speed. Plates were by no means as rapid as they are at present, and to propose a developer which was weak in alkali was to condemn it entirely. Power was then absolutely indispensable. No matter what good qualities might be absent, if there was power, all else could be forgiven. This was one of the reasons for forgetting the fact that lime might be used in the developer.

But is lime neccessarily a weak developer? That question came up some months since, while considering the subject of developers. Certainly not. The trouble with the old formula was that the lime was carried by water alone. Why not use saccharate of lime and thus carry many times as much lime as could be put into water?

To do this a heavy syrup was made first and dehydrated caustic lime was dissolved in it, until the point of saturation was reached. No effort was made to secure the absolute saturation. A quantity of lime was added to the syrup and it was made to take up as much as it would by frequent shakings. This was used as the alkaline solution and an attempt was made to use it in place of potash in an ordinary developer.

The first stumbling-block was encountered when a dram of lime was poured into the developing graduate. Six parts of saturated solution to 100 parts water. The water refused to take so much, and a dense white precipitate was formed. Evidently the water of the devoloper must be made sweet, as well as that in which the lime was dissolved. After the delay of making a syrup with plain water and white sugar, from 6 to 12 parts of this were added to 100 of water, then the 6 parts of the lime solution could be added without precipitation. But when it became necessary to put in the sulphate of soda, a strong smell of sulphurous acid announced that a new difficulty had been met. At the same time a dense cloud of sulphate of lime showed itself. Again a new developer was mixed leaving out the sulphite. In this experiment all went well until the pyro was

added. This was in liquid form, preserved by Mr. Newton's old oxalic acid formula, 3% of acid to the water, and pyro added to the extent of 10%. This, in parenthesis, it may be said, is the most perfect method of keeping pyro that has yet been proposed. The moment that the pyro was put into the developer, it was made cloudy by the oxalate of lime, as might have been expected.

After these various mishaps, which were instructive as showing what must be avoided, a proper developer was secured by adding from 6 to 12 parts of the heavy solution of sugar to 100 of water, putting in the usual quantity of dry pyro to the ounce (3—4 grains) and then putting in an additional 6 parts of the saturated solution of lime. The first thing to be noted at this point, is the fact that the lime stains the pyro. The stain is a deep purple color, but the solution remains quite transparent.

The staining of pyro by lime appears under these circumstances to be quite different from oxidation. It makes its appearance instantly, is different in color from that which comes after a little exposure to the air, and is identical with the stain which lime gives to gallic and tannic acids.

Upon trying this developer on a gelatine plate where the exposure had been somewhat short, it was found to act very energetically. The image came out with great rapidity and the development was over in so short a time that no trace of stain was produced. A sufficient number of plates have not yet been developed to speak with certainty in regard to the characteristics of negatives developed in this way. An accident, soon after the first trials, broke the bottle containing the lime solution and there has been no time since to repeat the experiments.

It was found that the lime-developed image had a good non-actinic color and very passable prints could be obtained from negatives which, if developed by soda, would be entirely valueless. It seems, therefore, from the trials given, that this lime developer, in which the quantity of the alkali in solution is greatly increased by the addition of sugar, is very powerful and the results so promising that further experiments are desirable. While it is not to be supposed that this is to be the developer of all others, it is worthy of a trial by all who are interested in the chemistry of development.

Lime requires 750 parts of cold water for its solution. Yet one

part lime and 6 parts sugar may be dissolved in 20 parts of water. By proper management the strength of the solution can be still further increased. It is said that there are four distinct compounds of lime and sugar. Some of these are much more soluble than lime itself and it is supposed that all of them are. The lime solutions are perfectly transparent and colorless. In preparing the lime solution, it is possible to use much less than 6 parts of sugar. But the stronger this solution is made in sugar, the less difficulty in preventing the lime from being thrown down when it is added to the developer. Whether the saccharate is more stable when made with hot water, we cannot now say. It is probably better made with boiling water and the quantity of sugar named.

WEIGHTS, MEASURES, AND THE COMPOUNDING OF FORMULÆ.

By R. C. Phillips.

At the present time, efforts are being largely made to bring about a uniform system of weights and measures, and to give photographic formulæ in such a manner as may most facilitate their compounding. We have here two subjects for consideration, either of which may be discussed independently of the other. Taking the first, we are told that the English weights and measures are chaotic, and should be replaced by the more scientific continental system. In this connection, much stress is laid on the word *scientific*, without any very exact meaning being attached to the term. We are told, for example, that a metrical system of measures is scientific, because ten million metres is (approximately) the length of a quarter-meridian of the earth and because its subdivisions run in decimals; as if these proper ties imparted to the system a *scientific* character not possessed by the English system of standard measures. Science is, however, merely systematic knowledge; and he who knows that a quarter-meridian is ninety degrees of sixty nautical miles, less a correction for the flattening of the pole, knows just as much of the matter as he who calls it ten million metres. In either case the "knowledge" is of the vaguest kind, merely verbal; no human mind can grasp the distance in question to form any real idea of its magnitude. Really, the metre was made to be a

certain number of Paris *toises* and parts of a toise in length, and when copied and circulated was known by inspection to be *so long,* just as our yard is. The same with the measures of capacity and the accompanying system of weights. No special claim to the term scientific then attaches to the units as such; the next question is whether their decimal subdivision confers on them that character. Those who answer in the affirmative, point to the adoption by the civilized world of a decimal system of notation in corroboration of their view; but apart from this fact, they can bring forward no argument whatever. Had people adopted a system of eleven digits and a cypher instead of nine digits, then would a duodecimal subdivision of standard units be the scientific system.

Bearing in mind that a duodecimal system is largely diffused through the decimal system of *notation,* we come in sight of the ground accepted as common by both contending parties. If the question is to be reasoned out at all, it must be argued from a mutually accepted basis, and this basis is supplied by the contention that the decimal notation has been adopted by large bodies of people from ancient times to the present. Sociological grounds are thus assumed as giving a scientific character to decimal weights and measures. The *science* claimed is no longer geodetics, astronomy, or one of the abstract sciences, but sociology, the knowledge of how peoples have acted and will probably act. (Not how they should act, as this belongs rather to the ethics of the future than the knowledge of the past.)

But accepting sociological science as the true base of metrology, it is hard to resist the conclusion that such systems of subdividing standard units, as have been evolved by the varied requirements of the users, have a far higher warrant than one which would usurp the place of all others, regardless of the convenience which attends each in its own special sphere of use.

The specializing of the words *score* and *dozen* and the founding on them of multiple units is not insignificant; they have come into use without legislation, and are used on their own merits throughout the civilized world. To abandon the packing and pricing of small articles *by the dozen,* for the convenience of foreign customers, would be to submit to national inconvenience for the sake of very doubtful advantages, advantages which would principally accrue to our foreign neighbors rather than ourselves. What an amount of valuable information, given in

British measures, would have to be reduced to the new standard were the present ones replaced by the metric system!

All statistical tables which are kept on from year to year, would require reduction from the commencement of the record up to the present, for the future and past results to be comparable with each other. Take for example the price of wheat per quarter for the last hundred years, and consider the labor of reducing it to francs per kilo. To do this, in order to spare our [illegible] a little arithmetic in international calculations, would be like paying off our national debt to spare others the payment of the interest, were such interest a farthing per cent. only.

Leaving this discussion, it will be seen that I advocate the "survival of the fittest" rather than legislative action, to decide our metrology, stipulating only that the connecting ratios of the units employed be definitely fixed to avoid misapprehension or fraud.

Turning now to the chaotic state of photographic formulæ, it may be presumed that the authors have taken their view and method of compounding in reference to different requirements of the users, and a little reflection will show that this must be the case. A plate maker issuing a developing formulæ for his plates has in view the professional who wishes to make up a large stock of developer to be used with but little variation; he therefore gives formulæ for "stock-solutions," and instructions how to dilute them to form solutions, A and B, which are probably used in equal proportions. He may also think it of advantage for the stock-solutions to be used up simultaneously, this will influence his choice of quantities. Again, he may remember that the nominal strength of certain chemicals is not their probable strength, and this will modify the formulæ. Other considerations may interfere with the full play of these principles, for example, did I give such formulæ as the following:

A.

Pyro	40 grs.
Water	10 oz.

B.

Ammonia .880	1 fl. dr.
Water	15 oz.

By mixing these in equal portions I should get a developer of 2 grs. pyro and 2 minims ammonia per fl. ounce, but by no means

could I get so much as 4 grs. pyro or 4 minims ammonia per ounce of mixed developer. Thus to gain *latitude* simplicity has to be sacrificed. The limit of solubility of a given chemical may defeat simplicity; thus, Prof. Burton uses ten per cent. solutions as a rule, but in the case of chrome alum, had to use five per cent. instead, as twice the amount would not dissolve. Viewing the matter from the experimentalist's side, we find that he dislikes a to th[illegible] of bottles, and wishes that the manufacturer of a formulæ would just state how many grains or minims per ounce the actual developer should contain. Lacking this information, he calculates for himself, and without great care fails in his object, and when he succeeds in getting the right result, he is appalled at the number of fractions in the answer. Nor does the annoyance always end here. Having a lantern-slide to develop, he measures ten minims of pyro solution in a graduate and adds it to the developer *without rinsing out* the graduate. Perhaps he then does the like with ammonia or bromide solution. But each time some three, four or five minims of solution run back into the little measure, totally upsetting the carefully calculated formula. This source of error is most prominent in the measuring of *small* quantities of *strong* solutions where it may amount to a large percentage of the whole. Try thus, for example, to measure the equivalent of ¼ grain of bromide of potassium by means of a ten per cent. solution. The measuring-glass must be abandoned as useless and *drops* counted instead. Then comes the question how many drops are equivalent to 2½ minims of solution.

The "ten per cent." ammonia also becomes gradually weaker, and towards the end of a five-ounce bottle is quite unreliable.

The busy professional, with a large stock of negatives to develop (as we all hope he may have), cannot be bothered with the ten per cent. minutiæ, and is apt to lose his temper when a new brand of plate or a new set of instructions accompanying the old brand sets his stock solutions topsy-turvey; he finds that the old formula acts well enough, or perhaps it seems slightly deficient in ammonia, so he makes it do for one and all by a slight modification.

But an evil day arrives when some important change is necessary; he then becomes immoral in his conversation with the developing subjects, and alludes to the plate maker in libellous language.

In order to put the plate maker on good terms with the two

classes of photographers named, I would suggest, that in addition to his "instructions," he should furnish an analysis of an ounce of developer, which would satisfy the experimenting amateur, and enable the professional to judge what modifications are necessary. This analysis cannot always be calculated by the photographer, as an example will show. Take the following:

No. 1.

Water	32	oz.
Yellow prussiate of potash	3	"
Carbonate of soda	3	"
Carbonate of potash	3	"

Who will tell, without actual measurement, what volume the above will assume? Something between 32 and 41 ozs. we can say with certainty, but nothing definite. A companion formula is:

No. 2.

Water	32	ozs.
Sulphite of soda	3	"

And then follow the instructions: "To one and three-quarter ounces of No. 2 add a quarter of an ounce of No. 1 and 4 grs. of dry pyro." The required analysis would run approximately thus: Analysis per oz: No. 1, 40 grs. each; No. 2, 40 grs. Developer: Sulph. soda 35 grs., pruss. potash, carb. soda, carb. potash, each 5 grs.

If these formulæ were printed so as to be cut out and used as labels an improvement would be secured, without any additional expense to the plate maker.

Should a change of formula occur, say carb. of soda 7 grs., carb. of potash 3 grs. per ounce, the photographer will have to know as much arithmetic as did they who sensitized their own albumenized paper a few years ago, to strengthen or dilute their silver bath to a required amount; otherwise I fear that no improved fashion of compounding developers will save their stock solutions from the sink.

A knowledge of the analysis will enable the photographer to make the required alteration; suppose that he has 20 fl. ounces of solution, then the contained ingredients are as follows:

Prussiate of potash	800	grs.
Carb. soda	800	"
Carb. potash	800	"

The carb. potash is in excess for the modified developer, the

carb. soda deficient; then, if the analysis of No. 1 modified be prussiate of potash 40 grs., carb. soda 56 grs., carb. potash 24 grs., we see that there is already enough carb. potash for 33 fl. ounces of solution, to which the stock must be accordingly *made up*, after adding the requisite quantities of the other ingredients. These will evidently be

Prussiate of potash .... $40 \times 32 - 800 = 480$.
Carb. soda................. $56 \times 32 - 800 = 992$.

Some such calculation as the foregoing would be necessary with any system of weights and measures, and the complexity of the work must vary from problem to problem; I would, however, urge on all the fact that facility and accuracy of calculation depend more on the acumen of the worker than on the system of metrology employed.

AN EASY METHOD OF DETERMINING THE RELATIVE SENSITIVENESS OF PHOTOGRAPHIC PLATES.

By Professor William H. Pickering.

When a photographer has purchased three brands of plates marked 60, 35 and 26 by their respective makers, he not unnaturally may wish to know which is really the most sensitive. He can readily settle the question to his own satisfaction, however, without any special apparatus, the first clear evening. Let him focus his camera for parallel rays by daylight; the larger and longer focus his lens the better. When night comes on point the camera on the pole star by sighting along its edge, as one might sight a rifle. This is necessary, as the stars are in general too faint to be seen upon the ground glass. Care should be taken that in this position the plate remains perpendicular to the axis of the lens, as some cameras are liable to bend when inclined. This difficulty may be overcome by resting the camera upon a board. One should use the full aperture and give an exposure of about ten minutes. On developing numerous stars will be found which are invisible to the naked eye. The stars will all leave trails, forming arcs of concentric circles whose center lies near the center of the plate. The plate should be given full development, as nothing will be seen upon it until it is fixed. Since the stars are in constant motion, the intensity of the images

is independent of the exposure, which effects only the length of the rails. To obtain a good stellar photograph, much more accurate focussing is required than for ordinary views, and it may be necessary to take two or three plates, varying the focus slightly in each case, before the best result is obtained.

In general a photographer wishes only to know which of several plates is the most rapid. To this end they should be exposed immediately one after the other and then each developed according to the printed directions accompanying the box. The experiment should be repeated two or three times in order to insure the greatest certainty in the result. The most accurate way of comparing the plates is to cut a circular hole one inch in diameter in a piece of paper and hold it against the back of the plate, so that the pole star shall be in the center. The pole star may be recognized as a black, somewhat elongated dot near the center of the concentric arcs. Now, with a pocket magnifier, count all the stars visible through the hole. The plate showing the most stars is the most sensitive. It is well to count them over two or three times, as if there are many it is at first difficult to make them come out twice alike. A difference of five per cent. in the total number of stars shown by two plates would make very little difference in their relative sensitiveness.

If it is desired to find out how many times more sensitive one plate is than another one must vary the aperture of the camera lens by paper stops placed in front of it, until the same number of stars are shown in both cases. The relative apertures of the stops then give the rate of sensitiveness of the plates.

HARVARD OBSERVATORY, CAMBRIDGE, MASS.

PHOTOGRAPHY AND LEATHER.

By H. R. Procter, F. C. S.

In Mr. Harrison's interesting history of photography, it may be read that as early as 1802, Wedgwood employed white leather as a sensitized surface, and found that it printed more rapidly than paper; and that 40 years later, the Rev. J. B. Reade, struck by the same fact, was led to experiment with the tannin of gall nuts, and so hit upon the use of gallic acid as a developer. Since the

technical chemistry of the leather trade is my daily work, the passage naturally struck me, and the more so because Mr. Reade's discovery was due to a misconception, which if he had been familiar with leather manufacture, he could not have fallen into, but might on the other hand have been led to the invention of albumenized paper. For, as a matter of fact, his wife's white kid gloves, with which he experimented, would be quite innocent of tannin of any description, since this leather is not tanned, but cured or "tawed" with a mixture of salt, alum, flour, and egg-yolks; and the sensitive surface he obtained would consist of chloride and albuminate of silver, together with organic silver compounds with the gelatine of the skin, and other matters, which it is well known are more sensitive than plain chloride.

In other directions beside this, photography and the leather trade have worked on analogous lines; witness the use of alum and chrome salts to harden gelatine films, and that of bichromate of potash, together with alum and salt, to tan leather.

It has been proposed to substitute tannin for alum as a hardening agent for gelatine films, but it is a familiar fact to tanners that all tanned leather darkens by exposure to light, presumably from oxidation of the coloring matters derived from the tannins, and very analogous to those of deal and other woods which are darkened in the same way. It is decidedly probable that a film treated with tannin would be similarly affected.

It may be worth noting that while gallic acid and pyrogallol are derivatives of the tannin of the oak gall, catechol, which is an analogous derivative of that of cutch and gambier, and probably also of the well known hemlock bark of America, has considerable developing powers.

CANOEING AND PHOTOGRAPHY.

By Frank H. Pullen.

It was to the canoe that I was indebted, some years ago, for my introduction to the camera, and the two soon proved to be admirably adapted to each other. A good many others have also learned how happy is the combination of canoe and camera, and, nowadays, the man who is counted among the ever-increasing army of "canoe cranks" is also very apt to be an enthusiast in photography as well.

The racing canoeist, who strives for speed, may not, perhaps, be greatly interested in photography; his time is too fully occupied in "monkeying" about his boat, sails and rigging. But the cruiser, who loves canoeing for the means which it affords him of getting away from city conventionalities and into closer communion with nature, is pretty sure to find room somewhere in his canoe for a camera, of which he makes good use at frequent intervals. The cruiser has leisure, or should have; for the canoeist who hurries when on a cruise loses half the charm of canoeing.

Compactness, lightness and strength are the essentials of a camera for the canoeist. His dainty craft has room for little beyond her crew and a limited amount of duffle, and she is so light herself that, as Rob Roy MacGregor puts it, "even the fly on deck must be denied passage," while canoe and cargo are subjected to frequent hard knocks when on a cruise.

A 4 x 5 camera of the much despised, but, nevertheless, useful ten-dollar variety, served me acceptably during my first season in a canoe, and some of the results obtained with it are still cherished among the choicest of my photographic treasures. But vast improvements have been made in the manufacture of apparatus since those days, and the canoeist can now provide himself at a moderate outlay with a far more compact and convenient outfit than was then possible. The detective camera possesses many advantages for the canoeist, who often finds snap shots very effective, but it should be accompanied by a tripod, for in the shady nooks into which the canoe occasionally pokes her nose, are to be found some of the most charming views obtainable, and, as instantaneous exposures are here out of the question, a rigid support for the camera becomes a necessity.

Glass plates are not only fragile but heavy, and where many are to be carried, especially in a canoe, the size of each must be small. Many canoeists have accordingly confined themselves to the 4 x 5, or even a smaller size, although the 5 x 7 plate is fast becoming popular, and from its arististic proportions, is far to be preferred to the long and narrow 5 x 8, formerly so commonly used by amateurs. The flexible negative films, now being successfully introduced, possess two qualities—minimum weight and freedom from breakage—which should particularly recommend them to the canoeing fraternity, as with them more plates and larger sizes can be carried. Going above 4 x 5 in size,

however, almost invariably means a decided increase in weight and bulk of the camera, not to mention the greater cost of the larger lens required, and, with the present facilities for enlarging pictures, the small camera seems to best meet the requirements of the canoeist.

Few canoeists, nowadays, would think of developing their plates while on a cruise. Better far to pack them carefully back in their boxes and bring out the latent image on your return home. Yet I once read of a cruiser who not only carried along a developing outfit, but used *wet-plates!* A wheelbarrow was required to move his traps when he went ashore, and while afloat under sail the canoe was so heavily ballasted that she was "able," as her owner expressed it "to stand up under anything short of a hurricane." But think of paddling such a load all day! Or of making a portage!

A liberal number of plateholders will be found very useful in cruising. Changing plates under trying circumstances is tedious work. A "dark room" is not readily obtainable in the open air and the canoe tent will not always afford protection from light. On a hot night, after a hard day's paddle, nothing is calculated to sooner take the photographic enthusiasm out of a tired and sleepy canoeist, than to sit for a while cramped up in the cockpit of his canoe with, perhaps, a heavy rubber blanket over his head, fumbling around in Egyptian darkness or working by the dim light of red hot, ruby lamp, which, mayhap, goes out at just the wrong moment. But with a changing-bag this labor may be largely reduced, and a plentiful supply of holders will save the necessity of frequent changes.

In selecting a ruby lamp get one which burns a candle in preference to oil. The latter, unless carefully guarded, sometimes has a faculty for getting loose and mixing itself up with the coffee, the sugar, or the grub generally. Keep a record of your exposure and number your plates, either by scratching the gelatine on a corner or by placing numbered papers between the plates in returning them to their boxes. Before developing, separate the instantaneous from the time exposures. Keep plates and camera free from moisture; wrap them up thoroughly and fasten them in the canoe. Somebody has advised that the tripod be stowed at full length in the bottom of the canoe. Don't do it. An indiscriminate mingling within the narrow quarters of the cockpit of two human and three tripod legs may result

disastrously to the latter. Fold up your tripod compactly and tie it to the floor boards. Make fast everything about the canoe, not necessarily in expectation of a turnover, for with decent treatment canoes seldom capsize, but the wise canoeist is always prepared for an emergency.

A camera is always a popular feature in camp, except when it catches somebody napping, and for the lover of out-door life, camp views have a peculiar charm. A cruise with canoe and camera gives opportunities for securing a varied series of camp views, interspersed with bits of scenery and pictures of odd characters encountered. Sketching is an accomplishment not possessed by every canoeist, but with the aid of the camera he may bring home a record of his cruise which will prove a lasting pleasure. A canoeing friend of mine, who has artistic tastes, has hit upon a happy plan for perpetuating the memory of his Summer outings. In company with his brother, who handles the quill and writes up the log, he annually cruises and camps for a fortnight on some beautiful lake, his camera meanwhile being in active use. Later in the season the log is printed and bound in with maps, cloth-mounted photographs and bromide prints of the views taken, the whole forming a handsome volume illustrating Memphremagog, Winnepesaukee, or Lake George, as the case may be—souvenirs of interest alike to author and artist and friends who may be fortunate enough to see the book.

As the canoe introduced me to the camera, why, photographic reader, may not the camera make you acquainted with the canoe? The latter will carry you to fields not visited before and open up to your lens picturesque views which unfold themselves to none but the canoeist. Drifting lazily down some winding stream, or floating upon the waters of a crystal lake, you encounter an ever-changing scene of beauty. Nature offers you her choicest subjects. Canoeing is a delightful recreation for young or old. There is healthful exercise in paddling, exhilarating sport in sailing. Above all, canoeing is one of the few manly pastimes confined strictly to amateurs and free from the taint of professionalism. Canoeing and photography are kindred amusements. Each is improved by association with the other, and the amateur photographer who loves not only his camera but also his canoe, is indeed privileged to taste the joys of nature to their fullest extent.

PHOTOGRAPHIC SOCIETIES—THEIR ORGANIZATION AND PERPETUATION.

By Milton B. Punnett.

"I'll give that society just about two months in which to bust," was the remark made by a well known amateur when asked to join a newly organized photographic society.

This remark set us to thinking, and we recognized at once the point, when we considered the number of photographic societies which, even within our experience, had developed and fogged. Having seen the following formula yield excellent and permanent results, we have thought it worth while to place it before our brethren in the art.

It is not necessary to dwell upon the advantages of such a society, for they are apparent to all.

FORMULA.

First.—The president must be chosen for his weight and knowledge of photography. It is best also to have a vice-president well versed in the art.

The treasurer should be a young business man.

The secretary should be an enthusiast, a "boomer," and a young man able and willing to write an article for the journals or newspapers. Upon the choice of secretary depends the greater part of the success of the society. A demonstration committee consisting of two or three should be appointed, whose duty it is to furnish some demonstration or subject for each meeting and it is part of the duty of the secretary to add plenty of alkali to this committee when they do not come up at the proper time, so that he can announce the subject for the next meeting.

Second.—After the regular order of business should come the demonstration and after that the opening of the question box. Let me say right here, that you can as easily develop a plate without a reducing agent as you can keep a society agoing without demonstrations.

They are the "hub" upon which it revolves. With the many processes at present one has a rich field to choose from, and it is not necessary that a person be very familiar with a process to give a demonstration of it.

Be careful how you appoint a member to write and read a paper at a certain meeting, for, unlike the image on an over

exposed plate, which first comes up and then disappears, he will disappear generally without coming up. For the writing of a paper is hard work for the majority of even the so-called educated men.

If he does not appear there will be quite a number of disgusted members who will vow they will not come again. A resolution which they generally keep. Moreover, a demonstration is interesting to those who may not belong to the brotherhood and does much towards gaining recruits.

If a lantern is obtainable have a meeting night set apart for the making of slides and let the members bring their negatives, the society furnish the plates, and all "pitch in" and make some. This evening has, in our experience, proved very interesting.

When sufficient slides have been made invite your friends to come and see them exhibited. The value of the photographic journals, to use a well worn phrase, "cannot be over estimated." You cannot keep up to the times without them. Not long ago, while conversing on matters photographic with an educated man and an enthusiastic amateur, we were surprised to find that he had not heard about "our" latest "hydroquinone developer." It is useless to say, he did not take a journal. Most editors will furnish societies with a copy of their journals in exchange for reports of the society's proceedings and from them (journals) you can obtain many a hint for a subject to demonstrate. Let some member be appointed to read before the society any article which they may think interesting in the journals, and if any member should find a subject which he thinks is worth demonstrating, and there is some expense attached to it, let the society contribute the necessary amount. Members should bring to the meetings the results of their work between the meetings.

The local papers are always willing to insert a notice and a *brief* report of the society's proceedings, and such notices will aid in securing members.

Most of the large dealers and manufacturers of photographic material have an *experienced* photographer "on the road" demonstrating their goods, and much can be learned by inviting them to appear before the society, as they are generally willing, after their demonstration, to give information on all subjects in the line of photography. Arrangements for their appearance can generally be made with their firms.

MISS LILLIAN SECCOMBE.

REPRODUCED IN "PHOTOPHANE."

Negative by Harold Baker, Birmingham.

See Advt.

The dues and initiation fees should be as low as possible and yet have plenty of money to furnish chemicals, etc., for demonstrations and to furnish the secretary with postals to notify the members and the press of the date of meeting, subject and demonstration.

As an intensifier we would state that under a careful application of the foregoing formula we have seen a society that could not get enough of members together to form a quorum, develop into a society that tested the seating capacity of the meeting room, which demonstrates "that the proof of the negative is in the printing."

STANDARD SOLUTIONS.

By Edgar Richards, F. C. S.

To how many photographers do the general developing or printing formulæ convey any definite idea of proportion or strength? The confusion of fluid ounces, drachms, pounds and gallons is bewildering. How much better to adopt in the first place percentage composition for all solutions, and, secondly, a system of weights and measures that are identical, *i.e.*, that the unit of all measures whether of length, volume, or weight, is a uniform standard, the multiples and subdivisions of which follow in decimal progression.

In making up any solution according to the formulæ, as found in the photographic journals, one would have to keep in mind the following weights and proportions:

Apothecaries' weights and measures, United States:

1 minim is the measure of 0.9493 troy grains of water.
1 grain is the measure of 1.0533 minims.
1 fluid drachm is the measure of 56.9618 troy grains of water.
1 drachm is the measure of 1.0533 fluid drachms or 60 troy grains.
1 fluid ounce is the measure of 455.6944 troy grains of water.
1 ounce is the measure of 1.0533 fluid ounces or 480 troy grains.
1 ounce, *avoirdupois*, is the measure of 437.5 troy grains of water.
1 pint is the measure of 1.2658 pounds or 7291.1107 troy grains.
1 pound is the measure of 0.7900 pints or 7000 troy grains.
1 U. S. gallon of 231 cu. in. at 62° F. and 30 in. bar. is the measure of 8.33 pounds or 58372.2 troy grains.

Apothecaries' weights and measures, Great Britain:

1 minim is the measure of 0.91 troy grains of water.

1 fluid drachm is the measure of 54.68 troy grains of water.

1 fluid ounce is the measure of 437.5 troy grains or 1 ounce, avoirdupois.

1 pint is the measure of 8750.0 troy grains of water or 1.25 pounds.

1 gallon is the measure of 70000.0 troy grains of water or 10 pounds.

It is very evident that a solution made up by the use of the United States apothecaries' standards would differ in strength and proportion from that where the standards of the British pharmacopœia were employed. One cannot tell where the word "ounce" occurs in a formula whether that of 437.5 or 480 troy grains is meant to be used, unless its equivalent is expressly stated, yet the difference of over 40 grains in the reagent employed might make a great distinction in the results obtained.

The employment of percentage composition for solutions would at once simplify formulæ and allow of ready comparisons being made in the proportions in which the different ingredients are used, both in the stock solutions and in the diluted developer. Take the following for examples:

		By Weight.	By Volume.
Pyro. stock solution	Pyrogallic acid	4 per cent.	5.00
	Sulphite Soda, crystals, C. P.	16 " "	20.
	Distilled water	80 " "	100.

Each unit of volume would contain 5 per cent. of pyrogallic acid and 20 per cent. of sulphite of soda. This is diluted for development, on average exposures, by the addition of nine volumes of water to one volume of the stock solution, 10 per cent.; each unit of volume of the diluted developer would therefore contain 0.5 per cent. of pyrogallic acid and 2 per cent. of sulphite of soda.

So with the potash stock solution:

	By Weight.	By Volume.
Carbonate of potash, granular, C. P.,	12.00 per cent.	15 per cent.
Sulphite of soda, crystals, C. P.	8.00 "	10 "
Distilled water	80.00 "	100 "

This is diluted for development, on average exposure, by the addition of nineteen volumes of water to one volume of the stock solution, 20 per cent.; each unit of volume of the dilute

developer would therefore contain 0.75 per cent. of carbonate of potash and 0.5 per cent. of sulphite of soda. In other words one half of the amount of pyro solution is used of the potash solution in normal development.

In each unit of volume of the mixed developer there would be 0.5 per cent. of pyrogallic acid, 2.5 per cent. of sulphite of soda, and 0.75 per cent. of carbonate of potash present. And these proportions would be maintained whether the amount of solution was intended to be used for a 4x5 or 20x22 plate.

The less ingredients a developer has, the better one is able to study the action of the reagents used, and can modify the rate of development to suit different subjects and brands of plates.

If the French decimal system of weights and measures are employed, no trouble will be experienced in making up solutions in percentage composition. The litre being the standard for volume contains 1,000 cubic centimetres. 10 grammes of any reagent in one litre of water represents a one per cent. solution. The calculation of the amount of any ingredient required to make up the solution called for by any percentage formula is therefore very simple. 5 per cent., weigh out 50 grammes; 14 per cent., 140 grammes, etc., etc., and make up to one litre. So when the solution is required for use, an eighth of a litre, 125 cubic centimetres, will be found amply sufficient to cover an 8x10 plate, consequently 12.5 cubic centimetres would be the proper amount to measure out for a 10 per cent. solution of the stock solution and then fill with water to the mark.

A *gramme* is the measure of a *cubic centimetre* of water; there are a *thousand grammes* in *one kilo*, and the like number of *cubic centimetres* in *one litre;* consequently the mind is not heavily tasked to remember many names or proportions.

If all photographic formulæ were expressed in percentages, any photographer could be able by the use of three or four standard solutions and water, to make up at any time from these stock solutions any formula that he might wish to experiment with. How often one sees in an amateur's dark room a collection of bottles with Smiths', Jones' or Robinson's formulæ written on them, requiring two and sometimes three separate bottles for as many different developers, which could be eliminated if he had taken the pains to calculate their percentage composition and find that the percentages in the diluted developers were nearly identical?

FOG OR FOCUS.

By H. P. Robinson.

Every now and then in the progress of photography there arises in some of its followers a wild desire to be what they think is artistic, even at the expense of their art, and occasionally it happens that, with a perversity which does credit to their imagination, some photographers will persuade themselves, and try to persuade others, that faults due to their tools or processes, or their own defective use of them, are real beauties worthy of the utmost admiration. Then we have been asked to admire portraits which have been devoid of all possibility of recognition through the movement of the sitter, and to appreciate the "careless artistry" of a torn film or a fogged image. Of late we have been asked to commend as atmospheric, photographs which are so much out of focus as to make the forms as indefinite as a London street in a November fog.

This is not a case of the "survival of the fittest;" it is rather an illustration of the revival of the unfit. There was a time, now many years agone, when art in England was at its lowest; the time when such robust painters as Constable and Muller were neglected; the time of Poonah painting and such like "accomplishments," when the greatest compliment that could be paid to an artist was that his work was "so soft." This appears to be the level to which these photographers desire to fall, for they seem to take a pleasure in neglecting all other qualities except a feminine softness.

That they are throwing away some of the most valuable parts of their art, will be easily seen on a little consideration. Every art method has its own individuality and characteristic features, which should not be neglected; for every art, I think it will be admitted, should be "of itself," according to its own nature. Oil painting has depth and richness; while water-color painting has a power of presenting light, space and atmosphere, not to be realized in so great a degree by any other means; and all must confess that the great distinction of photography from every other art is its extraordinary facility for giving definition and detail. This, if I may say so, is its one talent which should not be hidden in fog, but, on the contrary, should be always relied on as its strongest point. When I say this I do not mean that everything should be sacrificed to focus. I too well know the value of

subordination and other parts of composition, and I trust my opinions on this point are too well known for me to be misunderstood. I am even willing to admit that extreme definition all over a picture is almost as unnatural as universal fog. The lens, in fact, within a certain plane, and with a small stop, sees more than the eye sees, and fixing the image on the paper, brings the details of nature nearer to the eye than the scene from which it was taken. This, however scientifically right, is artistically wrong, for it is the mission of the artistic photographer to represent what he sees and no more. The scientist may use the microscope if he likes but not the artist.

Yet there is another side to the question. With many subjects the eye, by its constant and instantaneous change of focus, or adaptation of vision, sees more—that is, more planes in focus—than is shown by the lens. A perfect photograph, to me, is one which shows all that the eye practically sees. This admission does not mean that the subject should not be so selected or arranged as to show or make prominent just so much and in such proportion as the photographer shall deem right, for it must be a work of art, and the mind of the artist must shine through his work. In a perfect photograph there should be no loss of atmosphere. If under-exposed there will be a want of atmosphere; if over-exposed there will be too much of it, even if the image is sharply focussed, while a properly exposed and developed negative will have all the atmosphere it finds in nature, and perhaps a little more, for distance tends to exaggerate exposure.

Nobody could more appreciate the beauty which atmosphere adds to a landscape than I do, and I always get as much as I legitimately can; but as my pictures are produced by photography, the atmosphere in them must be a photograph of atmosphere, and not the result of a defect in the lens or the misuse of it.

An object at a distance is perfectly in focus to the eye, its mistiness is due to the intervening atmosphere, and not to a defect in the eye, as out of focusness is of the lens. Shortsighted eyes, of course, must be excepted. I am writing of the ordinary healthy eye and not of exceptions.

These photographs look so like drawings, we may be told. It is not easy to see how they are commendable for this resemblance. It is not good art to do by one method what could be better done by another. A drawing should not imitate a photograph, nor a photograph a drawing. The imitation of one art by another is

bad at the best. A water-color "quite photographic" in its minute finish is not the best that can be done with water-colors, or David Cox's drawings would not be so much esteemed; neither does a photograph which "does not look a bit like a photograph, don't you know," do credit to its maker.

And now I must make some few reservations, for there is danger in extremes, either in focus or out of it. I admit that there are occasions when part of a picture may be put out of focus—never the whole of it. If atmosphere must be represented, get atmosphere, (to paraphrase the Quaker's advice about money) honestly if you can, but get atmosphere. That is, get atmosphere legitimately if you can, but if you have not skill enough put part of your picture out of focus. I not only admit, but approve of that very slight diffusion of focus which softens but does not obliterate. My objection is to that ostentatious display of contempt for the characteristic points of the art and the affectation of artistry which can only see beauty in defects, for I am Philistine enough not to be able to admire anything because of its faults.

Finally, if our object is to represent nature, we should seek for means to extend the range of vision of the lens, or some equivalent for it. If its immovable gaze cannot see a sufficient range of planes at once, it should be made to do so at twice, or even three times, rather than increase the defect of the lens by putting the image more out of focus than need be, and calling the aberration atmosphere. There are occasions when it is impossible to avoid some parts being out of focus. This should be looked upon as a misfortune and should only be allowed on the principle of the old proverb, "needs must when the devil drives."

THE LANTERN BRINGS THE WORLD IN VIEW.

INTRODUCTION TO AN EXHIBITION OF VIEWS IN EGYPT AND PALESTINE.

By Marcus H. Rogers.

[A Picture of the Globe Upon the Screen.]

When the earth had been created God said, "Let there be light!"
And His holy word records it was pleasing in His sight;
For the wondrous things of earth, in the Great Creator's plan,
We know from inspiration were made alone for man.

For our appreciation He filled the world with beauty,
And if we fail to see, it we fail to do our duty;
For man may never know how much this life is worth
Until he sees what God has done to beautify the earth.

And that mankind may travel, we have nature's law supreme,
And we voyage 'round the world by the mighty force of steam;
But still all cannot wander to take the world in view,
And so He gave this graphic art which brings the world to you.

God's light, it is the painter, which traces on the glass
The perfect forms of nature, and hence it comes to pass,
Without magician's wand or conjuror's commands,
We see reflected on the screen these views of foreign lands.

"MODELS."

By Harold Sands.

In discoursing upon this theme a good motto to adopt would be "first catch your model then make your picture," for of a verity the ways of models both amateur and professional, are curious in the extreme. Speaking as one having not only authority, but also experience, there are few things more difficult to realize by photography than a composition picture in which figures sustain the chief part, and for producing such the aid of one or more models is necessary. I may here premise that in speaking of models, the live species is meant, not what the late Charles F. Brown used to describe as "wax figgers." Models are of many kinds: good and bad, sympathetic, antipathetic, apathetic, too willing, or obtrusive, and too timid, *et hoc genus omne*, and it is of these I propose to write. Those whose aspirations and desires soar above the mere making good landscape photographs, (though I am far from desiring to seek to depreciate the value of photographic training, acquired in studying this branch of the art as a preparation for the higher branches), such fellow workers will, I am sure, concur that the principal difficulty in constructing pictures by the aid of the camera, that convey some real meaning, and suggest a story, be it humorous or pathetic, of a nature entirely distinct from the conventionally treated, insipid, photographic portrait, is

the model, and should you have an idea involving the handling of more than one, then the arduous nature of the work increaseth in the proportion of eight to one. Now, the best model, generally speaking, is a brother artist who may reasonably be expected to have some fellow feeling for the conception you may be attempting to realize, and who will join willingly with you in your endeavor, and being hardened to being taken, is devoid of nerves, and surprises by himself your wishes, as Count Smorltorbe said of politics. When you succeed in finding some such sympathetic soul, I would say with Polonius: "The friends thou hast and their adaption tried, grapple them to thyself with hoops of steel," and being found, work him (or it may be her) for all he or she is worth, but avoid making him figure in anything ridiculous, or you may lose your friend and model, and that at the same time; above all, as far as possible, avoid too frequent use of the same head for a wide range of character unless fictitious aids of false hair and making up are employed; no greater mistake can be made than to employ one head for Judas Iscariot and John the Baptist in a charger, and hang the resulting pictures in close juxtaposition, or you may (as many do) overhear criticisms the reverse of agreeable on your work when exhibiting; again, *par exemple*, you may use a head for the study of a barrister in wig, gown and bands, and next day perhaps the same head as a sailor in orthodox naval rig. Here the range is so wide and the costumes so different, that even were the two pictures hung side by side, that it may, and probably will escape notice that the same model has been used for both characters, seeing that strong contrasts in dress and in subjects often serve to conceal your paucity of models. In photography, I grieve to say, the supply of sympathetic models falls far short of the demand; two of the best I ever knew were men who would sit half an hour without winking (scarcely breathing, despising headrests), as anything, and in anything; they have joined the majority, and their loss has created a void which is unfilled and will, I fear, remain so. Next we come to the antipathetic model; by this term is implied one possessed of all physical requisites, but who does not like being taken; then comes the apathetic model, who in his languid way, is also exceedingly kind, and who doesn't mind being taken at all, or as anything, so long as there is no trouble for him, and you don't bore him too much; as for letting himself go, and trying to shed a glow of expression and feeling

over your effort, that is a hopeless expectation generally; there is about as much sensibility in him as you find in a pump handle, and as much depth of feeling as may be found in the common or field turnip; still, when models are scarce, even the apathetic must not be despised; for in judicious hands their very stolidity renders them of use in making studies in humble imitation of the Dutch school of art, as for instance, pictures by Rembrandt, Maes, Teniers, Ostade, and many more, much as the playwright says, may be done by kindness, and sometimes even an apathetic model may wake up and show a faint gleam of interest in your work; nay, I have even known cases of such becoming actually, infected with the prevailing epidemic and become (for them) enthusiastic amateur photographers. Now we come to the too willing or gushing type of model, generally of the (not always) fairer sex. These are almost always over anxious to be taken, but it must be in their best and newest frock or tea gown and with their hair elaborately banged; as for expecting a fashionable young lady to rig herself out in a fancy dress (unless it is very becoming) and help you to render a series of pictures illustrating love's young dream in a lower grade of life than that in which she moves, it is mostly n. g., and you will run the risk of being told, as I once was, that such an idea was too thin; the possessor of a very charming head that would have done admirably for a Hebrew study, such as "Marianne on her way to execution," after Waterhouse, A. R. A., explained to me that such was not the way in which *she* wished or expected to be taken, and as for entering at all into my plan for a composite "figger" picture, truly the poles were not more remote than was the chance of her catching on. As regards male models of this class, I have but little to say, except that they carry quite as heavy a cargo of personal vanity, and have, if that be possible, a greater dread of being made to look ridiculous. I often notice faces in the streets that did I but know their owners, and could get them to sit, would lend themselves admirably to reproduction in and for pictorial effect; but the outside public being in bulk uneducated as regards the requirements of our art, is unappreciative, and would probably regard you as a dangerous lunatic, did you accost them and ask for a sitting in costume without any previous introduction.

Lastly comes the too timid model, generally shy, bashful and awkward, who unless you have *savoir faire* enough to succeed

in setting at ease, only fails to enter into your ideas from nervousness, and the novelty of the situation of being taken. This wears off as it is found to be different to their anticipations, and that the ordeal is not so frightful after all; often with time and patience they become excellent models, even when as in the case of juvenile ones, they have, as Charles Leland says, endless little winning ways of making themselves disagreeable; for, of a truth, an offended model may be the means of your wasting many plates, and that right cruelly. It is a pity that the great book of this gifted writer on "Snooping" is not more widely known, for no photographic library is complete without it, and it only needs to be known to be appreciated by photographers for the many and valued hints given therein; often when reading the chapter on the snooping or disturbance of artists at work, I have wondered he had not written a sequel on "the snooping of photographers working out of doors considered as a primeval sin," and wished that he had done so; but with the advent of the detective camera, all that is changed, and now it is the artist himself who snoopeth the world at large, using them as unconscious models. This may be looked upon by all of us who have, and do still suffer from the public depravity on this point, as a righteous retribution. Those of my readers who peruse this article will bear in mind that in penning these lines from the storehouse of experience, both of myself and friends, I write as an amateur, and for amateurs, for professionals of any standing are "maistly real cannie bodies" and stand in little need of information. We owe them a large debt of gratitude, for it is by the conception and rendering with the camera of picturesque ideas that men like H. P. Robinson, Adam Diston, Slingsby, on our side, and Landy, McMichael, Falk, Cramer and many more across the Atlantic have raised photography to the level of art, and enabled its productions to rank, equally as works of art, with any of those produced by wielders of brush and palette. Now there is another class to which I have already alluded, I mean the unconscious model, *i. e.*, one taken unawares with a detective camera, some of the results obtained are admirable and are of undoubted value to artists, but it is not in this direction that any advance is to be looked for, seeing that it is all hap-hazard work, and affords no opportunity of following those rules in art so necessary for the formation of a picture of real art value. Could we but find a

photographic bacillus with which to inocculate the outside world à la Pasteur, or Dr. Koch, so that they would have more sympathy with and might take a livelier interest in our aims, what a solution it would be; but I fear the day of its discovery is as distant as the Greek kalends, or photography in natural colors, and its chances of use as small as honesty on a railroad board. It was my privilege a few days ago to hear a paper read at the recent annual conference of the Camera Club, in London, by an eminent A. R. A., on "The Relation of Photography to the Pictorial Art," and in as much as he is so gifted in the reproduction of the phenomena of nature and rendering scenic effects with the brush, that it seems as if he were gifted with the mathematical precision of one to whom all art is but like a rule of three demonstrable by scientific formula. It is needless to say the subject was handled in a most masterly manner and was listened to with the greatest attention, and the views therein enunciated were of high value. Stress was laid on the evils of over production, and to this, in connection with my subject, I wish also to refer for those who look upon the camera as a means of, in the words of Shakespeare, "drawing the form and model." I hardly agree with the views of the artist, that owing to the fatal facility engendered by modern improvements, photographs are made far too much on the "pot boiler principle," and in far too great a quantity, which is *the* reason that so much technically excellent, but artistically mediocre work of a tame and uninteresting nature is exhibited. Time for preparation is an element lacking almost altogether in the calculations of the modern school of photographers who expose plates somewhat on the principle of firing indiscriminately into a covey of game. Now to carry out, construct and compose, the conception of a picture, say a figure study with more than one model, whether interior or exterior, requires at least a week in careful preparation, and if you are sufficiently *au fait* with the pencil to be able to jot down your ideas in rough sketches, these will be of great assistance, even supposing one high class picture a week to be produced, that would be fifty-two per annum, and I have yet to learn of any artist turning out any such number of pictures, either in oil or water color, of any merit; now after providing for the needful in the way of background accessories, and such costumes as may be necessary for the carrying out of your idea, the model must be

sought for, if not on hand, and above all other things it is needful to seek to arouse their interest, and inject them with anxiety to do their level best to aid to secure your, or as the organ blower would phrase it, "our" joint effort at making a picture being a success. Models should be, after due preparation, introduced into the studio, posed rapidly so as not to weary them, the exposure made, and duplicated when practicable. I am aware that not many of us amateurs are so fortunate as to have at command studios of our own, but the various manuals give such ample information and instruction on the erection of temporary expedients for such in gardens, greenhouses, *et alia*, that it is needless for me to enlarge upon the theme, merely remarking that the fine results I have seen obtained by professional photographers abroad, are in great measure due to their working in large, lofty, well-lighted and appointed studios, and employing the best lenses to be had; of course, brains are a large and all important adjunct to the above, for without them our work is indeed a thing of naught. The artist of whom I spoke told me in course of conversation that "to him the value of a photograph lay in its exquisite rendering of fine detail with sharpness and truth. Now, said he, people often call unsharp, fuzzy pictures "artistic," but this is untrue, especially in portrait work, which, in the main, is retouched out of any likeness to the original, and so flatters the sitter as much as any painter can do; a picture may have the principal objects microscopically sharp yet be soft, and have great tone, range and strong contrasts without falling on one side into the scylla of ink and chalk hardness, or on the other into the charybdis of the so-called fuzzy school to whom sharpness anywhere is an abomination. Lest it should be thought that he spoke as an artist only, I append the explanation that he is himself a photographer, and of no mean calibre, and that not of yesterday's standing, either. So his remarks have a double weight and value. Undoubtedly when you have plenty of good models you can make the most of them by observing the best figure compositions of artists, both ancient and modern, and the study of the laws which govern their construction; for without some knowledge of this last no success can be hoped for, much less expected. Artists' models, as a rule, don't seem to fancy sitting to be photographed; all those I have ever come across seemed to have very decided objection

to it, but the why and wherefore I was unable to discover. Suffice it that they did not freeze to the idea at all. Perhaps the best models and most to be desired are those whose profession is the stage, actors and actresses are so used to posing before audiences that they know the best points and expressions, and fall naturally into poses that bring out salient features to the greatest advantage, and keep hidden any defects; then they know how to make up the face for age or youth, as required, which makes them simply invaluable, so that if you succeed in rousing their interest in your work, they will make up for and sit as everything and anything, and no character comes amiss to them; also they have the power of calling up any expression at will that the exigencies of the case demand, from a smile to a scowl. And here it may be remarked that the hardest of all the photographer's burden is to be able to dominate by his will the sitter's expression. While treating of this subject I may remark that it is not sufficient to have even the most kind and painstaking models unless you have a fitting wardrobe available to drape them. The average male costume of the present day is probably the most hideous that could be designed; but when high collars are replaced by "neck ankerchers," and broadcloth by fustian, the more ragged the better, there is scope for picturesqueness and points of interest to come to the front. So that it is in the lower ranks of life that variety of form and shape and lack of formality and stiffness in costume have to be sought for. In a figure picture relatively little attention need be paid to accessories. *Simplicity* should always be the keynote of the picture; try to concentrate the interest on the figure which ought to be the hub of the whole thing, and not mitigate its effectiveness by striving to crowd in a lot of nonessential accessories. To do so is to detract from the, I may almost say, most precious quality to be found in art, either of the pencil or the camera; let both costumes and accessories be scrupulously correct, if you attempt any studies from the antique, and as I pointed out last year, let the accessories correspond with the period to be portrayed. Anachronisms show ignorance, and it will not do to attempt to picture characters of the Wagner Trilogy as being in keeping with modern store grates. It is errors of this kind that degrade our art and cause our brethren of the easel to point with the finger of scorn at such, stick out the lip and say: "Aha! Vaulting ambition which o'erleaps itself and falls on the

other side." Why do these ignorant photographers strive to invade the domain of art, and attempt what only the painter can portray? By far too much attention is given to landscape photography in most exhibitions, and figure studies form but a small percentage of the collections shown. Yet what can be more interesting than the human form divine in all its varied aspects. To my mind such work is of far greater interest and value than the finest landscape ever reproduced by photography ; and it is in this direction that progress must be sought and hoped for, for in it alone can we hope to vie on equal terms with our confreres of the easel. As a rule, it is as well to adhere to the more modern phases of life as seen every day, and not attempt to portray characters of a century or so ago. Albeit, the rage seems to be for costumes prevalent at the beginning of this century (at least on the stage). To conclude with the lines of he poet,

> "Life's trivial round and common task,
> Should furnish all we ought to ask,"

either for pictures with or without models.

DISTILLED WATER.

By Irving Saunders.

Having been troubled some of late to get clear results when developing negatives, and thinking the water used might have something to do with the trouble, I have substituted distilled

for ordinary water with good results. I herewith give a very simple apparatus for producing the same. It is made entirely

of copper with the tinned side coming inside or in contact with the steam and water.

The steam rising and coming in contact with the inside of cone, which is kept cool by occasional change of water above, is condensed and settles into a trough at bottom of cone and thence through the tube into a receptacle.

The still may be operated by placing on the kitchen stoveor over oil or gas stove and the work goes on rapidly. A half pint of the first water condensed should be thrown away and a quart or so left in reservoir at the finish.

The faucet is to draw off the upper or cooling water when it becomes hot and requires changing. Reservor may hold 10 or 12 quarts.

PRACTICAL NOTES.

THE METRIC SYSTEM IN PHOTOGRAPHY.

By Coleman Sellers, E. D.; M. Inst., C. E.

Now and then some writer for the journals advocates the use of the French or Metric System as very much better than the weights and measures in use in America and England. For more than forty years I have been considering the subject, and nearly that long ago the system was introduced in its entirety into the business I was then connected with. When Wm. Sellers & Co. were made the sole licensees of the Giffard Injector for supplying steam boilers with water, as it was a French invention and the drawings received from the patentee were figured in millimeters, it was decided to continue the use of the Metric System in the department of brass work. After many years use of the system and after we had become perfectly familiar with the system, so as to make its use automatic in the mind, we became more and more convinced of its disadvantages in the mechanic arts, the chief trouble coming from what is called its greatest merit, viz., its being a decimal system. A decimal system does not lend itself to an easily memorized series of shop sizes, while a unit, such as the inch or any other convenient length divided by continual halving to the smallest size needed in the trade, gives what can be retained in the mind without effort. Thus, if I say our shop sizes are by sixteenths up to one inch, by eighths from one to two inches, and by quarters above that size, the mind grasps

it, but not so with the Metric System, or, rather, with a decimal system.

Twist drills made in Germany are advertised as advancing by one millimeter up to say 400 millimeters, but the makers give in bold-face type the sizes used in their own shop, or, in other words, their system of shop sizes. These are given as follows: 10, 12, 15, 18, 20, 23, 25, 28, 30, 35, 37, 40, 42, 45, 47, 50, etc. This series comes from one of the most perfect establishments in Germany, from a place noted for its perfection of workmanship and its scientific methods. The sizes translated into our measures are nearly what we use, and this for the reason that the Whitworth system of taps and dies are used in Germany, and the sizes selected must conform to the English sizes.

I will not dwell on this part of the subject, as what I have published on the subject is accessible in the proceedings of the societies before which I have read papers opposing the system.

In the case of weights, it is a matter of no moment as compared to that of measurements of length and surface and solidity. There may be great advantage in the use of a decimal system in chemical manipulations. Most chemists do use the Metric System, but very few druggists or doctors do so. They did a few years ago, but very few prescriptions are so written at the present time. I have not one word to say against the use of the Metric System in the compounding of developing solutions, but it must be borne in mind that nearly every one in the beginning thinks much of accuracy in weights while later their scales are seldom used.

In my own practice, I measure solids in the graduated glass, and can hit the weight as nearly as with scales in most cases. The country doctor shakes out by guess the three grains of calomel quite accurately, as I have many times tested. What I want now to call attention to, is the fact that in France, where the Metric System had birth and where it is enforced by law, no one ever expresses his or her height in centimeters, but in feet and inches, and that, too, means the old French foot and inch, which is longer than the foot of England and America. So French makers of spectacle glasses grind them to the focii expressed in the old French inch. Weights of human beings are, in Germany, given in pounds, not in kilos, and the rod one meter long is still in literature called the yard stick.

The majority of people using the French system for the first

time in compounding developing solutions must translate the weights into the ones they are familiar with.

HOTEL DARK ROOMS.

With the increase of amateur photographers there should come a change in the accommodations offered by innkeepers to those who travel camera in hand.

Not many days ago, walking by the beach at Atlantic City, I noted an Englishman with some sort of a detective's camera in his hand. He remarked as I passed him: "The hotels offer no accommodations. They have no dark rooms where I can change my plates." I, too, had failed to find a dark closet at my hotel, but the professional photographers are always ready to help. I noted one who had a sign, "Humblestone, Instantaneous Pictures," on his place of business, and who had good pictures in his show case, outside his door. Proposing to him to hire his room for a few minutes, he met me with a hearty welcome. "Walk in and make yourself at home. I am not using my dark room, and you are very welcome to use it free of all charge." To him I hinted, as a speculation, that a small closet might yield him a small income if he would advertise its use for plate changing at a moderate rate, or for developing for a trifle more. Such an arrangement would be of use to the traveling photographers, who, if like me, are not inclined to accept such kind favors without doing something in return. Two dark rooms at Atlantic City have been loaned to me by strangers, the owners feeling pleased when not busy to chat with the tourist.

Advising my host of the hotel where I stopped to have a dark closet for his visitors, he replied that but one had asked for such a place, and he had formed, with the help of a bell boy, a dark place in the cellar.

It has been a notion with me to have hotel keepers provide for this want on the part of their guests as sure to make their place attractive to amateur photographers. It would cost but little, and be very acceptable to their patrons.

For the want of my own developing outfit, I asked Mr. Humblestone to develop a few of the flexible films coated by Mr. John Carbutt, that I might judge of exposure, and this he did for me, charging moderately and giving me full knowledge as to the time the plates would require.

Many a batch of pictures have been spoiled from the want of the

treat of first exposure at a new place, where the light may be different from what it is at home.

If others will help me scatter seeds of instruction among hotel keepers, the time will come when we will find a good dark room in all hotels at watering places.

WOOD FOR CAMERAS.

No wood equals mahogany for durability and certainty of retaining its shape. Cherry is used by some makers for plate holders, but it cannot be compared with the first named. Having made for my own use a number of detective cameras, each representing some improvement in design, and superceding the ones that preceded it, for these I used the more costly wood for the outer case in constructing the first one, but since then, have made all of American poplar, on account of its lightness and the ease with which it is worked. As the box is covered with fine leather, it matters little about the wood, lightness being an important consideration.

I have in mind a lesson on woods, learned many years ago, when yet a boy I undertook to make a very large cylinder electric machine. The glass cylinder was lined with a wash of Chinese vermilion in shellac varnish. The wooden caps to be cemented on the two ends, to which caps the metal journals were attached, were made of very dry cherry. On the afternoon of the cementing on of these caps I called to see my mentor and teacher, a maker of philosophical apparatus, and telling him of my work, he asked about the wood used. Naming cherry, he startled me by telling me to hurry home, to place the cylinder in the oven of a stove, and thus to remove the caps. He went on to say: "It may be too late now. I have never seen cherry used for this purpose, but that, sooner or later, the shrinking and warping of the wood is sure to break the glass." I found my cylinder destroyed when I reached home, and its mate, with mahogany caps, is in my possession now, good after fifty years of use or idleness.

Such lessons as this fix in one's mind qualities of wood. In Scotland, in the Museum of Edinburgh, as also in the South Kensington Museum, London, the cases to hold exhibits are made of mahogany, ebonized, not of cherry, blackened, as we would do. Prof. Archer said to me, in explaining this, that the cases should be black to be unobtrusive, but that mahogany was the only

wood that could be so blackened and be sure to retain its shape without warping. One is naturally surprised to see a costly wood hidden under black varnish, but its selection for the purpose teaches a lesson in camera making.

As the base board of the shutter to regulate exposure, mahogany can be used without cleats to hold it in shape.

Now that celluloid has been introduced as a substitute for glass in dry plates, dealers might make small double shields much thinner than for glass. I am using the Howell films in Anthony's small double shields, with and without backing card, and can see no difference in result. It looks as if one-quarter inch might be taken from the thickness of the double holders, and thus save bulk.

FLASH LAMPS.

Those inclined to make experiments in photographing with magnesium powder can make a very good spirit lamp of parts procurable at any lamp store. A metal set reservoir with a so called Niagara burner will do well. The burner named is provided with a circular wick that is attached to two flat feeding wicks. Stripping the burner of all the central parts and the button, which is over a perforated cylinder and flush with the wick-carrier, a cone of tin can be inserted, from which a brass tube is carried between the feeding wicks, and being soldered in place, is ready to receive the rubber tube and blowing bulb. This simple lamp, filled with alcohol, is lighted after the cone is charged with metal magnesium powder, a pellet of cotton wool being first placed at the bottom of the cone to keep the metal out of the flash tube. A metal cap to cover the wick, air tight, when not in use completes the device.

Perhaps better lamps can be purchased ready made, but with some photographers there is pleasure in making such things for themselves.

SOME PRACTICAL SUGGESTIONS.

By A. M. DeSilva.

Should a negative be overtimed and developed flat, by placing it in the mixture of hyposulphite and red-prussiate of potash of the strength recommended by Mr. Farmer (hypo. 1 to 16 water red prussiate, q. s.) as soon as it leaves the fixing bath, the

weaker parts will be thinned more than the stronger. Then, after well washing, the film can be intensified, and somewhat improved thereby. I recommend this only when another good negative cannot be made. But it frequently happens that we get the lights too strong in an otherwise very good negative. In this case, after thoroughly washing the fixed negative, and *allowing it to dry*, by using the *hyposulphite of soda stronger* (one to four of water) with the addition of a little of the ferri-cyanide (how much will depend upon your film) the stronger parts will be reduced, and it is not until quite a large quantity of the red prussiate has been added that the thinner parts begin to go. It is advisable not to carry the reduction too far, for it must be borne in mind that, although the films require and receive a very thorough washing after the application of the above, the action continues for some time afterward. These operations should be done by lamp light, one having an opalescent shade being the best.

There is another way of greatly improving prints from very strong negatives. It being so many years since I first recommended it, that probably some of the vast army of photographers who have grown up since then may be benefited by my repeating it here. It is to expose the sensitive paper to light for a short time (one to two seconds in sunlight)—until a *very slight* tint is produced—*previous* to laying it on the negative. The action of light set up is continued; and while more harmonious prints are produced, there is none of the dullness to be seen on prints made on paper that has been "flashed" *after* the picture has been printed. Should any portions of the negative be masked out with paper, it will be necessary that a pretty non-actinic one be used, otherwise (after exposing the paper to light) it will print through the mask.

I like clean negatives (and who does not?) and try very hard to produce them; but there are times when "something happens," and that something comes in a very bad spot, notably skies. Then there are times when the skies are thin, or would be improved by a little doctoring, printing-in of clouds; or, as in a portrait, a bad shadow or dark that does not blend well in vignetting. I thank my stars that "away back" I learned the dust process—the best of all to help out in these cases; but there is another very elegant and ready and simple way of doing it, and that is, after the back of the negative has been carefully cleaned,

to varnish it with fine ground-glass substitute, and when dry to work over the desired places with a large round camel's hair brush, with finely-powdered black lead. Should a dense coating be required, then it should be done before the varnish has quite hardened. By this method, that particular *something* which is on the edge of every line is preserved; your foliage has an atmosphere and your skies nicely blend. On the top of this, if necessary, build up your vignetting mask, at least half to three-quarters of an inch above the frame, and cover all with fine tissue paper. Scratches on the back of the negative so deep that even under tissue paper show in the printing, succumb to a coating of this varnish. I need scarcely note that any dirt in them must have been cleaned out previously.

If you have an under-timed, hard-pushed-in-the-developer, sandy-printing negative, varnish the film with a *fine* sample of the substitute and you will rejoice over the result.

A very neat way for a beginner to learn to flow varnish and collodion over the negatives evenly is to clean off some old films. To prepare the albumen as recommended in the text-book (1 to 10 or 16 of water), and while the plates are wet to pour on the albumen evenly without running it over the back, avoiding bringing up the plate in too vertical a position, which would in the case of varnishing or collodionizing, produce unevenness and parallel lines in the film. By-the-way, while on this subject, a stock bottle of albumen is a mighty handy thing to have ready. Some plates, on being varnished, are very much reduced in quality; the alcohol in the varnish dissolving part of the film. For these, after thorough washing, before placing on the rack to dry, flow over them a solution of the albumen (1 to 8). This will prevent the varnish from attacking the gelatine film, thus preserving the original "bloom" in the negative.

BLISTERS.

By Dr. George L. Sinclair.

However much I may approve of blisters, from a professional point of view, like every one who has to do with photography, I have found them a nuisance when appearing on a print. I speak in the past tense, for they are no longer things to be dreaded. I generally use *S.* and *M.* double albumenized paper,

not from choice, but because it is the only kind which one solitary dealer in photo goods keeps on hand.

I read up all about the probable cause of their appearance and tried all the various methods recommended for their prevention. I was most careful as to the strength of my fixing bath, using it all the way from a saturated solution to one in thirty-two; I was particular to give the print a good wash after toning. I regulated the temperature of the fixing solution and the water for washing after fixation. I tried diluting the fixing bath gradually, and I used a solution of common salt of various strengths, into which the prints were put immediately after having the hypo solution.

Sometimes one or all of these precautions succeeded in part or in whole; but there was an element of uncertainty, which, to say the least, was unsatisfactory. For the last two years I have adopted the precaution of adding liq. ammonia to the fixing bath. *I have no more blisters.*

I use the ammonia (50 p. ct.) in the proportion of a teaspoonful to a quart of solution of hypo. This imparts a distinct odor, but I have never seen any bad results, and, as I said, it is a specific against the appearance of blisters.

I notice that when fixation is complete, the prints have a translucent appearance, and the paper seems to have less body than when hypo is used without ammonia, but they appear to me to require less washing and I cannot see any deterioration in the appearance of the print when it is dry. I never use a burnisher so do not know if the ammonia would have any effect in preventing the print taking the glossy appearance which some people admire.

I think I can confidently recommend the addition of ammonia to the fixing bath to my fellow amateurs, as a means of surely preventing the occurrence of blisters, without doing any injury to the picture.

Another word to those amateurs who prepare their own sensitized paper: We all know how it tends to curl at the edges when floated on the silver bath. Of course this will not occur if the paper is not too dry at the time of sensitizing. It is not always easy for me to use it in any other condition. I have expended an immense amount of breath, which I may need badly some of these days, in blowing the paper gently back upon the solution.

Somebody advised using a piece of plain blotting paper,

slightly smaller than the paper which you are sensitizing, placing it upon the surface. It rests perfectly flat, tends to force out any bubbles which may form, and most effectively prevents the paper curling by its steady and uniform pressure.

It need only be left in contact with the paper a minute. Upon removing it, it will be seen that the albumen paper is evenly spread and that it lies quite flat in contact with the solution.

To facilitate the removal of the blotting paper, a loop of thread may be made at each end which will form two handles by which it can be lifted from the sensitized paper, without the risk of pushing it down below the surface of the solution or possibly spoiling the paper. Try these two plans.

HALIFAX, N. S.

INSTRUCTION.

By Miss Adelaide Skeel, Newburgh, N. Y.

Although but a woman, she developed her own plates and scorned sister amateurs who took pictures on the press-the-button-manufacturers-do-the-rest principle. Admiring friends considered her a pastmistress in photography, and it was true that her views gave away easily under pressure, sold at fairs, and more than once received honorable mention in the Sunlight Club, of which she was a leading member. Lately, growing a trifle ambitious, she had entered some prints at a prize competition, and she tells me she was hesitating about offering an editor a negative to be reproduced for illustration, when something happened which made her leave the head of her class and take the foot. If there had been a foolscap she would have put it on, after something happened.

What happened? Did her camera have a tumble? No, she herself had the tumble, and may be a few of the most feeble of the INTERNATIONAL ANNUAL'S readers will be helped in their scrambles up hill by reading her account of an

OBJECT LESSON.

It is said, sometimes, that professionals are jealous of us amateurs, but while I have heard nine-tenths of the graves are filled with fools, I cannot believe the living are such idiots as this state of mind would prove. Professionals will not help us for nothing,

because time is money, and I, for one, never blamed our little artist at home who put a card in the paper stating:

I am a busy man.

I am a professional.

I have many orders to fill.

I cannot stop my work to talk.

Advice to amateurs—one dollar an hour.

After this I blundered along in the red light alone, and at least saved both pride and pennies, for I developed my own plates and signed their death warrant with my own pyro-stained hand.

Soon after this a photographer of another ilk came to town and I made an early opportunity to show him my album and to ask for criticism. To ask was to receive, for he diagnosticated my case very quickly.

"You have a few good views," he said, "but your work is inexcusably unequal. Photography is an exact science; why don't you get a dozen first class pictures out of every box of plates. Your work lacks sharpness and density. You are primed with book larnin'; let me give you an object lesson." We went out doors, set up my machine and focussed on a group of boys, coasting. I noticed that Teacher looked more with his eyes than I do, and spent less time with his head smothered under the focussing cloth. Moreover, he knew exactly what effect he wished to produce, and consequently gave the children no contradictory directions where to stand. He was unyielding, too, about the different poses, requiring with gentle insistence that each lad should sustain the attitude in which he had been placed. At the last moment, before drawing the slide, he said a word or two to the little fellows which stirred them into life, but alas! the electric magic of knowing the right word to say at such a moment cannot be taught even in an object lesson. The artist was in sympathy with his subjects and they with him, so, of course, at a touch, the fire burned. The result was like an instantaneous view, although we gave a true exposure.

Next, we went into my dark room, which Teacher condemned as much too dark, saying, one could safely work with light sufficient to read the labels on every bottle on the table. Then we mixed the developer, but my pyro was pronounced too old. It seems fresh pyro should be almost as colorless as the alkali, while mine was of a rich red. The next heresy was a request for old developers, of which I had none, as I always throw everything away

between the developing of each batch of plates. The books tell us to keep it over in glass stopped bottles, but I have thought this rule more honored in the breach than in the observance. My views come up generally in about five minutes, but this object lesson went to prove that a full quarter of an hour is not too long to get required density, and of course this was done by a weak developer. In extreme cases, Teacher told me to accelerate by a drop or two of hypo. If one wishes to use plates for illustration, density is a first consideration, only as in returning trumps, one must use judgment. An editor of a certain ANNUAL, famous for its illustrations, told me that he examined hundreds of negatives before he found a half dozen correctly developed for reproduction in photo-gravure and moss-type. Those who make albumen prints get too much density, and those who favor Brounde's, too little. A slow developer gives the surest results.

My hypo bath, almost a saturated solution, was condemned as too strong. I own I thought there was no harm in making the solution stronger than one to five, but my adviser tells me a too powerful fixative eats the film like a knife. After the last washing, which we made more thorough by the use of salt, our plates were placed not in the rack, but on blotting paper, where they dried evenly and quickly. Alas! when all was said and done, one and all were found to have my usual error, they were not sharp. It was now time to examine my machine and to find where the chief trouble lay; *the ground glass did not register the same as the plate holder.* We made sure by placing a ruler across the former, on the frame, and measuring with a card the distance between glass and ruler, and then placing the same ruler across the holder, in which a plate had been placed, and slide drawn, finding again the distance between ruler and plate and comparing the two. In my machine the distance was doubled, so that the focus was always set back.

The manufacturers assure me that this does not happen once in a hundred times, but in case some reader of this paper may be the hundredth man or own the hundredth camera, I mention this mechanical difficulty as one easily remedied, but fruitful of much blurring if not corrected. Here am I, the taker of a thousand views when I have never, except by accident, focussed one!

Surely, I was ready to put on the foolscap and take the foot of the class even before I heard my teacher's valedictory.

"Good bye; don't be discouraged. I was a beginner once. I

took portraits when I couldn't focus, and I bought a gallery when I only knew very little more than you do. Keep on trying. I was like you, once upon a time, and positively did not know anything. You can't know less than I did, because, truly, I knew nothing. Good bye."

After this I have nothing left to say, save to advise those who know nothing at all, and yet dream they know it all, to take an object lesson.

BLUE PRINT TRANSPARENCIES.

By Hinsdale Smith, Jr.

This process, while it may not be new to some, has never before, to my knowledge, appeared in print. It is simply blue printing on translucent paper. Not only do the details come out finer but the picture appears much bluer and richer than when printed on ordinary paper.

The paper I have experimented with, is what is known as the French Parchment brand of draftman's tracing paper, and can be obtained of most dealers in drafting materials. I have never tried other brands, but presume they would work satisfactorily if they contain no oil.

The ordinary blue print solution may be used to sensitize this paper. The formula I have used is as follows:

No. 1.

Red prussiate of potash	½ oz.
Water	½ oz.

No. 2.

Ammonio-citrate of iron	½ oz.
Water	2 oz.

Use equal parts of each.

This formula has given me splendid results on this paper and also on plain blue prints. Be sure that the chemicals are fresh and keep in separate bottles in the dark. They ought to work well for five or six months, if not exposed to the air more than is necessary.

To sensitize the paper mix about one half ounce for a sheet 18 x 22. Pin the sheet down to a board and spread the liquid evenly over it with a small sponge or brush. The paper expands

greatly on being wet so that the pins may have to be reset while it is drying. The secret of sensitizing this paper or any other without streaks is not to use too much liquid. The paper drys with a crinkled surface, but if the printing frame has good springs this does not seem to effect the sharpness of resulting pictures.

Printing must be carried much further than with an ordinary time print. After printing, wash in water, as usual; much less time is required to do this than with the ordinary blue print.

They may now be laid out to dry if you prefer them with a crinkled surface; to dry them smooth, glue the edges down to a board while the prints are wet, giving the edges time to dry by wetting the center once in a while with a sponge.

They may be mounted for hanging in a window by cutting two mats from cardboard and mounting between them. These prints may be toned like other blue prints, which gives them a beautiful silky appearance.

BAD WEATHER VERSUS WASTED HOURS.

By S. R. Stoddard.

Anyone who has waited tedious hours at some uninteresting railroad station for the expected train that did not come, and realized the blankness of the time, with so many precious moments utterly wasted out of a busy life, will understand something of my feelings when I peered out through the little window of a log camp in the Adirondacks one morning last Fall, and saw the dreary drizzle outside—something that was more than fog but less than rain—the black uninviting woods, the soggy ground, and the heavy clouds that clung close to the tops of the tall trees, and into which the misty mountains entered and were lost.

To be exact as to time and place, it was the 27th day of September, in the year of our Lord 1888, and the place Lake Colden, one of the wildest lakes of the Adirondacks, 2,700 or more feet above tide.

We had left our comfortable quarters in the club house at the "Ruined Village" the day before, lured by a break in the clouds that seemed to presage pleasant weather, and tramped to this point seven miles, with two days' rations, intending by a forced march in the morning to reach Lake "Tear of the Clouds,"

away up on the side of Mount Marcy—the highest body of water in the State and the pond-source of the mighty Hudson—make photographs of it and the infant stream that can here be dammed by a clod the size of your hat, but that, later, floats vast fleets upon its turbid bosom and invites the commerce of all nations, and reach again our quarters at Adirondack for the night. But before we had half climbed to this point we had passed successively through sunshine, rain, a snow flurry, and a dash of hail, and the night that followed settled dark about us as the proverbial stack of black cats.

Here the Adirondack Club, who lease several thousand acres of wild land, including the highest mountain peaks and lakes about Marcy, Indian Pass, and the deserted village of Adirondack—had built a snug log cabin of one room with a fireplace, and a kitchen with a cook-stove attachment, all of which they had placed at my service. There were six of us all told, myself and an assistant, with four guides and packmen. We had all the comforts we could desire; a supply of blankets to make us comfortable at night, wood for the chopping on every side, and one of my men was an artist in the use of the ax, a cook-stove and all necessary cooking utensils—and plenty of food seven miles away. We had brought supplies sufficient for our supposed needs for the two days I had expected to be out, but now the weather precluded any possibility of making schedule time in our trip to Marcy, even when we started, which did not seem at all likely to happen soon.

Toward the middle of the forenoon there were indications of a breaking away of the clouds. One man was sent out for supplies. Taking the others, I started for Avalanche Lake, and was well pleased at getting, during the sun-bursts that came at long intervals between the clouds, two 16x20 views and two or three smaller ones, of this wildest of all wild Adirondack lakes, and one picture of the men going forward on a portion of the rocky trail where hands seemed as necessary to progress as feet, and where it would have made little difference whether the sun shone or not so far as its direct rays were concerned. Later it settled dark and gloomy with signs of approaching storm, and we returned to camp and dinner.

It was not very promising certainly, and anything but "photographers' weather," but before night came I had been prospecting, and discovered, not far away, one of those characteristic

open camps which every Adirondack visitor knows so well. They are made by laying a pole across between two crotched sticks set upright, or in the crotches of two trees that may stand at a convenient distance apart, and lying against this pole at an angle of about 45 degrees, other poles with their lower ends resting on the ground and thatching with cedar or balsam boughs, forming when complete, a structure like the half of an ordinary sloping roof of a house covered with bushes. In this you lie on a thick bed of spruce or balsam boughs with your feet to the front, the whole interior kept warm, sometimes uncomfortably so, by a fire which your guide, if he happens to be a good one, keeps burning all night. It struck me as a desirable subject for a picture, and I utilized it that night by photographing my four men in the midst of an exciting game of euchre, which I am grieved to say, they seemed very familiar with, and practiced quite often while in camp. I gave them positions, with hunting and fishing accessories standing or lying carelessly about; had a good blazing fire built in front, and let off something over an ounce of powdered magnesium on a line with them and the fire, and as low and close to the latter as I could without bringing it within the field of the lens. The result is a very satisfactory picture of a representative camp in the Adirondacks by night, with men indulging in a not uncommon little game by the light of the campfire, which shows at one side, and which, from being in a line with the actual light seems to be the source of the light itself. The picture I call "Game in the Adirondacks."

Another attempt of a 16x20 plate was not quite so satisfactory, as by careless adjustment of my little machine for firing magnesium, the figures, camp and all, seem threatened with destruction by a volcanic discharge of fire from a miniature Vesuvius, or a picture of those boiling, Fourth-of-July things that I believe are known as "flower pots."

The next morning was not promising either, but toward noon bits of sunshine were discovered racing over the mountain, and I went across the lake, where, through an opening made larger in an artistic manner by Coon the ax-man, I had planned to get my picture of Lake Colden, and set my cameras in position to take advantage of the first favorable moment that might present itself. Over beyond the lake, Mount Colden rose like a pyramid, wet and black save where bits of snow clung in its rifts

and edged the long glistening streak that descended from summit to base, marking the path of the avalanche of rocks that swept down it years ago, or where water ran in streams down its scarred sides, glistening like silver when the sun touched them. Sun spots raced rapidly up from the south and over the mountain, increasing gradually in size and frequency. Now they measure rods, now acres, now the whole mountainside is lighted up, now the lake is in sunshine and the mountain in shadow. Now comes a curious cloud up over McIntyre and a grayish mist sweeping out from the pass from the north. It is a snow squall which passes and the sun shines brightly out once more, and between it and the next, which follows fast, the exposures are made and the resultant picture comes out with a noticeable softening at either end where the mountain is vignetted by the squall that has passed,and the other that is approaching, and the cook is waving his tablecloth, or something of that nature (as a fact, I believe we didn't see a tablecloth anywhere about camp) from the distant point, as a sign that dinner waits. That finished our work for the day, for squalls followed one after another.through the afternoon, and when we looked out the next morning the ground was covered with white, and untold millions of beautiful snow-flakes were descending softly through the dusky forest, settling silently down, clinging to whatever they touched and making white plumes of the tall trees, and bending feathers of the dainty ferns and graceful bushes that bent over the brook that ran close along our camp.

Down in the clear water of this brook were great motherly trout, hovering watchfully over the bits of ground they claimed as their particular own, for it was their spawning season and they had come here in accordance with the instinct which leads the mother trout to seek clear, running water and some spot where she can pretect her offspring until the small fry is able to shift for itself. They came here in great numbers, seeming to have lost their accustomed shyness and fear of man. I counted over fifty golden-spotted beauties within a space of five rods from the door. Does anyone wonder that they were undisturbed? The law says of them at this time of the year "Thou shalt not kill," and if this were not sufficient—if there should still be men base enough to disregard a law that is so eminently just and proper (and there *are* such men hereabout occasionally), their safety has been provided for by the association that holds

this territory as a preserve, and who keeps a watchman here throughout the season to guard their interests and make sure that the game laws of the State are rigidly observed.

About our door the venison hawks came flitting silent as the gray fog through the trees, or hopping from branch to branch, and finally down on the rustic table almost within our reach, to filch bits from our small remnant of venison that was hanging there. How fearless the sly slate-colored rascals were with their white caps and coachman's-capes, and their impish beads of eyes that watched us knowingly, and peered impudently up at us as if saying "catch us if you can." But I astonished one of them and it gave me great comfort. I tempted him and he fell; I fastened an attractive bit of meat to a strong thread and laid it carefully out on the edge of the table. He came boldly forward, seized it in his bill and carried it away—the length of the string. And what a surprised bird he was when it stopped; the look of astonishment which he cast back over his shoulder when the prize stopped suddenly while he was darting straight away with it, as he supposed safely in his beak, was something extremely ludicrous. Then again would he try it with the same result, and again, and again. At length his discomfiture was complete and he gave it up as a bad job, taking up his position on a distant stump, where I feel confident he sat looking at me for some time in a hurt, not to say most reproachful sort of way.

Did the snow spoil all chance for work? Not by any means. I made a "Winter View" of the old camp. A pail hung over the blazing fire supposed to be filled with steaming coffee. Benham, the cook, sat there poking something about in a stew-pan, with basins and other dishes about. Coon was coming with his ax in one hand and a huge log on his off shoulder. Frank stood on one side, in an easy position and an ulster, talking to your humble servant who was seated on a log wrapped in a huge blanket and warming a pair of attenuated hands over the coals, while Bob, the prince of humorists, stood in his favorite position —of rest.

Bob was a "character." He was twenty-two years old, stood six feet four and weighed 225 pounds. A Connecticut Yankee born; he came into the Adirondacks first in pursuit of his health —and the most casual observer would say at once that he had unquestionably found it. Bob could stand as much comfort as any man I ever met in his profession, and he would go to such

lengths getting himself comfortable as would have tired out two ordinary men. It was as good as a circus to have him along, for he furnished not only comfort to himself, but amusement to everyone around him in the most good natured way imaginable.

Snow on the ground, on the trees and in the air, the next day, and a man was sent out, as usual, for provisions.

Was I euchred—there? I expected I should be led into using some expressions of that nature by hearing so much of it in camp—but I wish to state that I was *not* "euchred" even by this most unpromising of days. There was no sun, and snow was falling all the time, but I found a pretty place out among the cedars where they stood bracing against each other like convivial and half-slewed cedars, with moss hanging from their under sides and snow on their backs where, with the camera protected by a rubber coat, I made the exposure with very satisfactory results. Another view was a snowy pathway leading through the woods where "the murmuring pines and the hemlocks" stood on either side "bearded with moss and in garments green" and the falling snow and the dim light made them seem "indistinct in the twilight," and worthy enough of a place among the Evangeline series. Indeed, I have in most cases found that wood-scenes are much better photographed on a cloudy day, as the sunshine, which I think always desirable in ordinary landscape work, often confuses by its bright blotches, and make an uncertain and indistinguishable jumble of trees and branches and bits of sky that may show through them. One of the best pictures I ever made of this nature was taken late in the day, in a deep pass, with rain approaching and dark clouds hanging low, so dark in fact that where, in an ordinary light, ten seconds might have answered, I gave that number of minutes. Who shall say that there must be wasted hours because of unfavorable weather? Then a huge mass of moss with springing ferns was brought into the cabin and photographed, and then Bob—who had dropped into his favorite position by the fireplace, with his huge limbs sprawling across the floor, and his head like a turtle drawn between his broad shoulders while figuratively plunged deep in the mystic miseries of a fractional "seaside"—was photographed by aid of a magnesium flash through the window, and the window being on a line with the fireplace gave grounds for the general belief that the light flooding my rosy giant comes from the fireplace itself.

Thus five days were spent, and on the sixth I resolved to make my long deferred attack on "Tear of the Clouds." So with snow on the ground and fog in the air—which however, we thought showed signs of lifting—we started on our six-mile climb. As we followed up toward the head of the stream the fog seemed to thicken. As we drew near the end of our climb we were tramping through snow fully four inches in depth, and when we finally reached the little lake we could scarcely see across it, although it was but a few rods in extent. We built a big fire among the trees and stood around for an hour or more—thawing one side while the other froze—during which we ate our lunch and got all the fun out of the situation possible. After a time the fog which at first was an impalpable mist seemed to granulate, to turn into discernible drops, then fine needles of ice formed in the air, then the needles gathered into bundles, and the bundles were snow flakes, that fell softly, adding to that which already covered the ground. I made the picture that I had come so far to get, between the fog and the snow, making a large and small one, where the dark, stunted cedars and bushes formed a contrasting foreground that melted away into the distance, as might the landscape on any misty day, without suggestion of the thick snow storm that soon gathered density and finely shut out everything as the fog before it had done. Then we tramped back to camp.

Next morning we broke camp and went out, and, although it was cloudy and snow falling at intervals, we stopped on the way down for the pictures of a lumber camp, of choppers at work, of a stream with logs "skidded" in readiness for the Spring flood, and a flash light picture of the men gathered, as is their wont of an evening around a stove in the big lumber shanty, listening while one of their number entertains the rest with a story—the usual literary pabulum here supplied. To be sure it was daylight outside, but I had the windows covered and lanterns lighted and in their usual position and for all practicable purposes, it was night within. Then we continued on our way down, and when we had nearly reached the old village the sun shone gloriously out and the sky was blue and innocent of the very appearance of evil, giving not the slightest indication of the scurvy way it had been serving us for a week past.

During the entire week passed where I had thought to spend but a night, there had been hardly an hour that would ordinarily

be considered good photographing weather, and yet I count among the results some of the most successful photographs of my collection.

Verily, he who pleads "bad weather" as an excuse for total failure in picture making is not above suspicion.

GLEN FALLS, N. Y., April, 1889.

SUCCESS IN FLASH LIGHT PHOTOGRAPHY.

By Henry Harrison Suplee.

When the magnesium flash light was first introduced it was looked upon by many as an ingenious and interesting experiment, and most amateurs were satisfied if they succeeded in obtaining anything at all upon the plate. Some, indeed, were so unsuccessful that they were prepared to pronounce the whole thing a failure, while others have become almost convinced that it is ultimately destined to be the coming method for portraiture.

In view of these widely differing opinions, it may not be out of place to examine with some care into the causes of success and failure with the flash light, as there must be good reasons for both opinions.

It must not be forgotten that the conditions which obtain with flash light photography are very different from those in either outdoor or indoor work by daylight, and success demands a corresponding difference in the treatment of the subject and negative.

In the first place, the light is concentrated at what may almost be considered as a point, instead of being diffused throughout the room, as in daylight. Any one who has noticed an uncovered electric arc lamp against a dark sky, must have perceived how the intense brilliancy of the point of illumination only served to heighten the contrast with the blackness of the sky immediately around the point, while a much weaker lamp, hanging in a street lined with marble or other light colored buildings, will appear to cause a blaze of light over the entire neighborhood.

Something similar occurs in the case of the flash light, and unless care is taken to provide proper surfaces to reinforce and distribute the illumination, the most conspicuous effect will be to heighten the already harsh contrast by deepening the blackness of the shadows. This effect is most clearly shown in

attempts to make flash light photographs out of doors at night. Objects in the direct line of the rays of light are shown up well, while the blackness of the surroundings is intense.

If precautions are not taken to distribute the light by means of judiciously placed reflecting screens, many personal defects are exaggerated to an unpleasant degree, by the single direction of the light, any roughness of the skin being brought out conspicuously, much in the same manner as the grain of the paper is shown in a copy of an engraving or print.

Properly managed, this control over the direction of the light is one of the most valuable features in the use of the flash light, and in the power to concentrate or diffuse the light at will, lies one advantage which may be used to produce some very striking effects.

Too light a screen behind the sitter should be avoided, as the direct reflection back into the camera will be apt to produce some of the ill effects of a front light, although if the costume be dark and contrast desired, it may be produced to almost any extent by this means. Generally, unless vignetting is desired, the background may be made of hangings of some rough material, absorbent of light, yet not dark enough to appear harsh. The color of all the surroundings must be considered, and light reflected from red or green surfaces will be found almost non-actinic. I once attempted a portrait in a conservatory surrounded by dark green tropical plants, and the negative was so badly undertimed as to be useless, although exposures on the same plates and a smaller charge of powder in the adjoining room were fully timed.

Just out of range of the angular aperture of the lens, on the side of the sitter, opposite to the light, should be a white screen from four to six feet square, or in home portraiture a sheet hung over a cord will answer well, and by varying the distance of this reflector from the sitter as well as its angle, the modeling on the shaded side of the face may be controlled in a very satisfactory manner.

The position of the light is of the first importance. Of course it should be out of range of the field of the lens, but need not necessarily be behind the camera, and a slight variation in its position often makes a great difference in the artistic effect of the picture. Consider carefully the direction in which the shadows will be thrown, and if the effect is doubtful a lamp may

be held where the flash is to be placed and the manner of lighting studied. The light should not be placed too low, and in many cases otherwise successful work has been marred by this defect. For a seated figure the flash lamp should be on a stand not less than five feet high, and with some subjects six feet would give a better effect, throwing the shadows of the eye sockets and lips downward and often adding greatly to the expression of the features.

The question of the amount of general light in the room has been very fully discussed already, and it seems to be an admitted fact that the expression of the eyes is governed very materially by the quantity of light in the room immediately before the flash. The natural dilation of the pupil in a dim light remains unchanged during the brief exposure of the flash and a very unpleasant stare is the result. A moderate light in the room will cause the eyes to contract enough to avoid this trouble, and in many cases the natural brilliancy is increased just enough to add to the beauty of the picture. Generally the image on the focussing screen is bright enough to enable the position to be adjusted, but a lighted taper should be used to obtain a sharp focus, and also to determine the limits of the field.

Screens between the sitter and the flash are entirely unnecessary, and the only reason for their use has been the lack of proper reflecting screens.

If soft and well rounded work is to be obtained, it is very necessary to use a lens capable of being worked with a large aperture, and, of course, a large portrait lens is desirable, but not absolutely necessary. I have generally used a Steinheil Antiplanetic combination, working with an aperture of 43 mm. and a focal length of 240 mm., giving an aperture of a little more than one-fifth of the focal length, which is as large as most portrait lenses will stand, and I have found it to be excellent. The plates should be as rapid as can be had in order to secure detail in the darkest shadows.

In regard to the powder to be used, I have obtained the best results with the preparation known as "Blitz Pulver," using charges of 60 to 90 grains, according to distance and subject. Pure magnesium, burned in specially constructed lamps, will give good results if there is no motion, but the duration of the combustion is a little too prolonged to secure the sharpness with rapidly moving figures such as I have obtained with Blitz Pulver.

It is desirable to have a time shutter with a bulb release on the camera, and a flash lamp also operated by squeezing a bulb, the latter being placed on a tall stand, leaving the hands free. The operator may then squeeze the shutter bulb and instantly follow with the flash and close the shutter again immediately, and in this way the lens is uncovered such a brief time as to give no chance for diffused light to enter the camera.

Too much care cannot be taken in the development of flash light negatives, and very often a fine picture is not given justice, through careless or defective development. A very slow development with a very dilute developer is essential, and an excess of alkali is necessary to obtain the appearance of full timing so desirable. The conditions do not appear to be quite the same as in the case of an instantaneous exposure by bright daylight, and under no circumstances should the image be forced up with a strong developer.

For a 5″ x 7″ plate not less than five or six ounces of water to one drachm of a saturated solution of carbonate of potassium, half a drachm of pyro solution and *no* bromide, is about right for a beginning. If dry pyro be used two or three grains will be enough. The proportionally large quantity of water permits the excess of alkali without danger of overdoing the matter. The image will come up very slowly and will be very thin, and owing to the small proportion of pyro the high lights will not attain any great density, no matter how prolonged the development, and hence ample time may be given to the shadows to permit them to acquire the very full detail so desirable in this class of work. The tray should be kept screened from the light and gently rocked, and twenty-five minutes to half an hour is none too long for the image to obtain the desired effect.

An examination by transmitted light will now show insufficient density in the high lights, and the developer should be poured off, and if it looks very muddy it had better be thrown away and a new one mixed containing two to three drachms of pyro solution to one of alkali; or if the first developer remained clear enough the pyro may be added to it. This will at once give the required density, and as the full detail has already been secured, a soft, harmonious negative with every grade of contrast will be the result, while had a less careful procedure obtained the effect would have been very inferior.

It is true that this requires usually three quarters of an hour

to each negative, but a fine picture is worth all the time it takes and a poor one is utterly worthless.

With good plates and a strong alum bath no trouble need occur from frilling, and in hot weather ice water should be used.

ON SPENDING MONEY.

By Frank M. Sutcliffe.

At a political meeting the other day, after the principal speakers had had their say, an orator arose and asked permission to say a few words; but instead of going into the middle of the fight at once by drawing pictures of Irishmen with white chalk on a black board, or in black chalk on a white board, or any such nation-stirring subjects, he commenced to call the attention of those present to the dirty state of the streets in the town where the meeting was held. Though the speaker doubtless intended to fling some of the mud he spoke of at his political opponents, the audience would not hear him and did not give him a chance of doing so. For fear the gentle reader thinks I am going to preach about the foolish way in which some people spend their money generally, I merely wish to say that I shall keep to photography. Whether the reader is an amateur or not he must spend much in the practice of his art. To obtain a good article for a reasonable price is, I take it, the aim of every one. A few years ago this was practicable, but the curse of cheapness and its accompanying nastiness has crept in. It is, I think, because of the great influx of beginners that manufacturers now make apparatus that no one who has cut their teeth would buy; but as every one is not able to visit personally the stores where photographers' stuff is sold, it becomes imperative that buyers who know what they want should be able to get what they expect for their money. That such is not the case the following will prove: Last year I ran short of printing frames owing to the continual wet and dull weather, which would not let us get the negatives out of the frames fast enough. I wrote to a dealer asking him to send me two dozen printing frames with brass springs. I underlined *brass*, as I had heard that lead soldiers were sometimes melted up for the purpose of making these springs. When the frames eame I didn't think much about them; not only had I other things to think about, but the frames did not appear to be worth much thought. However, I threw five of the twenty-four into the coal

hole, as I was sure that any negative put into them would of a certainty be broken; the remaining nineteen I gave to the printers. Shortly after I found that four more had to be cast aside because they broke every plate put into them; the springs of other six had broken across, and the other day I found that only one out of the twenty-four was in use because either the screw head of the other eight had flown off or the wood was too rotten to hold the screw. Now for the reason of all this: The frames were charged to me at eleven pence halfpenny each; when a boy I bought some, same size, for three shilling's and sixpence each, which are in use yet. I need not point to any moral. Again, I was in a store not long ago when a man came in to order some paper. I thought the price quoted was low. After the customer had left the dealer said to me: "That chap prides himself on his sharpness and must buy everything for the lowest possible figure;" then closing one eye, added, "but we only give him nineteen sheets to the quire." Yet again: I recently wanted some mounts of a particular size, which I wrote for to a firm who used to supply me with firstrate mounts nearly as thin as paper but as "hard as nails," frontside, inside and backside equally good; but I found to my disgust that instead of the old kind I now received a parcel of mounts with one side tolerably smooth, but which were so rotten that if you happened to take up a mount by one corner the rest dropped off and left only the corner in your hand; any photograph mounted on these made the whole board curl up as if it had taken a fit; it only required a little persuasion to get them to roll off the table on to the floor. Therefore, reader, do try to let your dealer know that though you appreciate his kindness, cruel though it may be, in supplying you with frames that will destroy and mounts that will walk off with your early efforts, yet when you come to years of discretion you are willing to give him a pocketful of odd coppers if he will only sell you apparatus that you can use with pleasure.

BLUE PRINTING.

By C. B. Talbot, Architect, N. P. R. R., Tacoma, W. T.

These jottings from the laboratory of that hard schoolmaster, Experience, may further good results each day and all the days

of the year. This requires (1) good paper, (2) good chemicals, (3) good printing arrangements, (4) good drawings or negatives.

(1.) *The Paper.*—This must be pure and free from any alkaline purifiers, containing no wood pulp (which turns black) or traces of metal from the pulping engine (to cause spots), but clean cotton, or cotton and linen. All linen is hard to sensitize, owing to firmness of its texture; but good when not too hard, giving fine color. It should be sized only slightly, with pure gelatine, and in such a manner as to leave it partially pervious to the sensitizer. If too much sized, it remains on the surface and is washed away, if too porous it stays in the pulp and does not bleach well. Starch causes a slaty, purplecolor; opposed to brilliant blue. Gum Arabic washes away, used as a size. The fine lines of the print and pale colored ink are only saved by means of a proper size, during the soaking of the paper in water.

2. *Good Chemicals.*—The citrate of iron and ammonia, and the red prussiate of potash from the several makers, have no uniform quality, and differ in lots from the same maker, and so it is difficult to make an iron-clad rule to work without fail. A word about these may be sufficient. Good iron is of a brilliant brown or a wine color, inclined to dark, if lusterless and dark, and *blue* when first mixed with pure water, will never bleach pure white in the lines; but remain blue to the last. The potash is usually good enough, but is best in large red crystals; if dusty and lusterless, little harm comes of it, except that more is required. The potash should be kept in solution but a short time, and the iron not in solution at all, as it soon changes to the inky blue color described and is worthless. To make the two solution formula, as commonly used, not only takes time, but is not uniform in results, owing to the changes that take place as it advances in age. So, three years ago we commenced, and still use the following formula, which has never failed to yield good clear prints for line drawings. One fluid ounce for one and a half square yards of paper.

1.

Red Prussiate of Potash	$\frac{2}{8}$ ounce.
Citrate of Iron and Ammonia	$1\frac{1}{10}$ "
Boiled or Distilled Water	6 ounces.
Concentrated Aqua. Ammonia	34 minims.

or: 2.

Red Prussiate Potash....................53 grains.
Cit. Iron and Ammonia...................86 "
Conc. Aqua. Ammonia.................. 4 minims.
Boiled or Distilled Water................. 1 fluid ounce.

Powder the potash in a porcelain mortar (not iron if wetted in mortar); add the water and pour into a stone jug or covered bottle and keep in a cool place. This will keep for ten days or two weeks, after that it is not so good, but it is well to mix the potash and water a few hours before use, if possible, yet it may be used at once. Add the ammonia only when you are about to add the iron (usually about four drops to the ounce of solution), then add the dry crystals of cit. iron and ammonia—stirring with a clean stick or splinter of glass. The iron will dissolve almost instantly, much better than in water only. A good way to weigh these when you have no scales, is to take two small tin plates for scale pans, and a straight stick twenty inches long, from the ends depend three small strings which tie into the edges of plates, a loop being in the middle to lift it by. Take a silver dollar and call it one ounce; half dollar, half ounce, etc., for weights, ten cents representing fifty grains nearly; grains may be represented by a slip of zinc of equal weight to ten silver cents. Cut up into ten parts, which represent now five grains each, near enough for all practical purposes, and as good as a scale that costs several dollars.

An eight ounce graduate and minim glass, with a good quart bowl, complete the vessels required. For printing from negatives, a solution not quite so strong may be made, to be used at once:

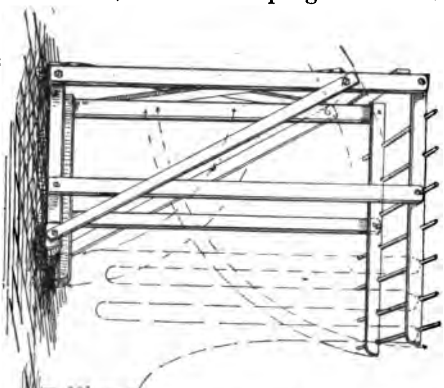
Red Prussiate Potash....................46 grains.
Cit. Iron and Ammonia...................80 "
Conc. Aq. Ammonia...............10 to 12 minims.
Water.....................................1 ounce.

This will also answer for line drawings, but does not look quite as well as the previous formula, and paper does not keep so well as the first. Paper with little size keeps better than paper with much size. Heavy sizing seems to fog when of a little age. To keep fine details as much as possible, two to three grains of dry gelatine, soaked in cold water and added to the above, in a warm water bath, add some brilliance and detail to negative prints, but spoils when a day or two old.

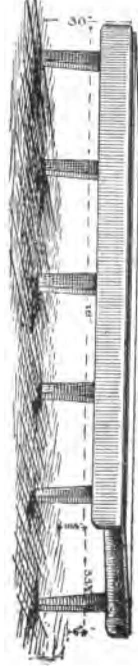
The plain sort prints best, when three or four days old, when kept from the damp.

To sensitize, we use two sponges about five inches wide when wet; the first well filled and partially squeezed out, and followed by a second one kept damp, only in sensitizer. To take up and equalize the surplus left by the first, each are moved in easy circles and not too fast over the paper. Brushes are not so good, and those having metal holders should never be used. The table should be about half inch narrower than the paper roll, thirty-six, forty-two (the most useful width), or fifty-three inches wide (see sensitizing table), and for this, the table has leaves of six and ten inches, so that the sponges will not touch the table when using. At one end should be a roller for paper and at the other end should be a rack for drying, with six or seven round sticks, ten inches apart and about five feet long, laid on top of a light folding frame, about seven feet high, as shown; the paper lying in serpentine folds, over, down and up among them, the work being done in a warm, dry room, (after night if it cannot be darkened). Paper will spoil in a few minutes if not dried quickly, and is the occasion of more mischief than is generally supposed. If paper is damp while being sensitized, the white will be of a pale yellow color, not removable by washing. If too much potash is used, the paper will be yellow when dry and remain so. If the iron is in excess, it becomes stone gray immediately

DRYING FRAME.



SENSITIZING TABLE.



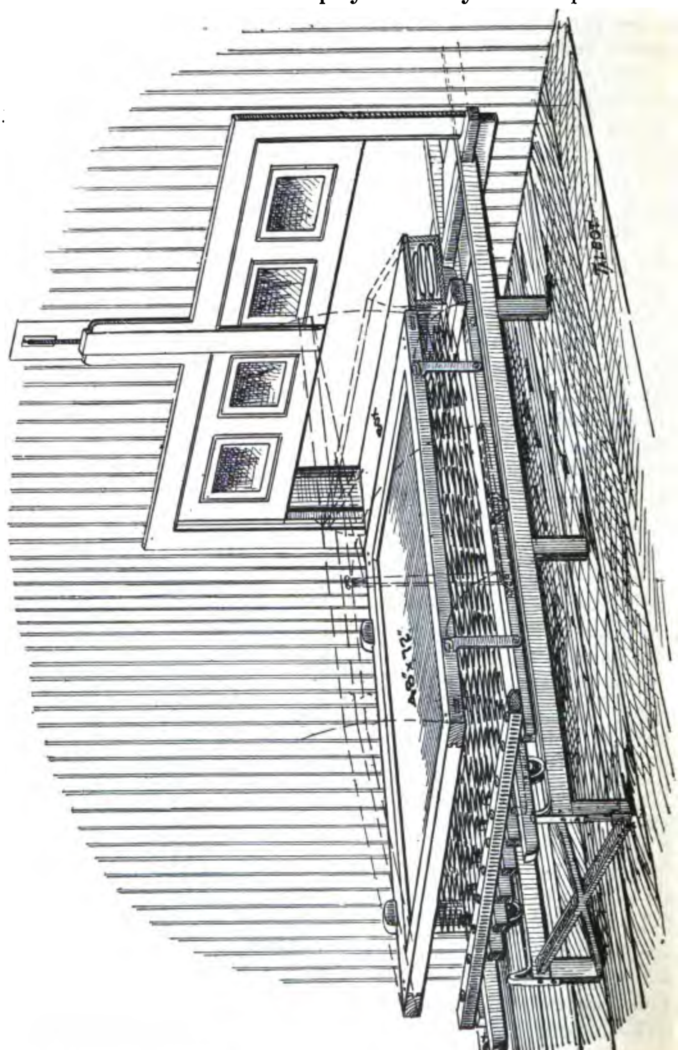
and dove color in the white when printed, which will come out if soaked for three or four hours, if not too much is used. When dry, the paper is best kept in a roll in a tight tin box, six inches diameter and two inches longer than the roll. Keep near a fire or in dry warm place, as the least dampness soon spoils the best paper ever made.

In our own practice we have a deep closet reaching down into the story below; the table being under the roof and the closet in the print room; at the upper end, it is covered with a counter weighted cover, the stick laid in notches on the top and level with the table, and in the lower part of closet, a coil of hot water pipe which quickly dries the paper. With these arrangements two men sensitize fifty yards of paper in half an hour.

3. *Printing.*—Next to the preparation of the chemicals, a good printing frame is important, and I will describe one that we have in use, the result of several years practice and improvements, in which the paper and tracing are put in *on top* instead of *at the back,* as commonly practiced. The glass plate, 48 x 72 inches, is laid on the under side of the rabbet, when looking at the top, and secured on the under side to the sash by a half inch stop screwed to the sash of solid ash, 2½ inches by 4½ inches. No putty or lead is used about it, as we have broken several through that means. The glass can spring and move in the rabbets with the heat and pressure better than if made to adhere to the wood. This one has been in use three years by all sorts of people, and good for three years more for all any one knows. When hooked down in place and under pressure the rain cannot enter any more than by the old plan of glazing. The pressure pad under the glass is made of narrow boards, 5½ inches wide and ⅞ inch thick, which are cut rather more than half off in twelve places, making thirteen blocks, as it were, in length 68 inches, being 4 inches shorter than the glass, to keep the wet on the sash in rainy weather from touching it.

On the sides, these boards are two inches narrower than glass in their extreme width. Eight of these boards are laid side by side and are placed so that an ordinary cardboard will move freely in the crack between them, and they are kept in place by three laths on the under side (see "Printing Pad"). The outside boards are screwed firm and fast to the laths, but the interior ones are left a little loose, *i. e.*, the screw heads are not

quite screwed home on each board where the lath crosses it. This allows the boards to play vertically but keeps them in



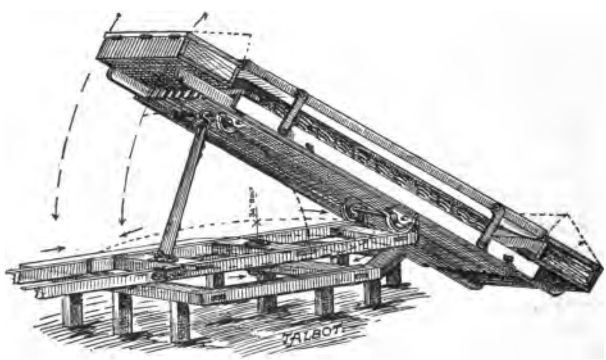
PRINTING FRAME INSIDE.

place laterally and from rubbing against each other on their edges or binding, or interfering with each other in any manner. Immediately under each board, there is a 2 x 4 inch joist having thirteen pegs, 1½ inch diameter and two inches long, each under

PRINTING PAD.

the middle of each block spaces or cuts above them. On each of the pegs, the small end of half of a common mattress spring is placed, and the wide end of the spring secured to the under side of the boards on the middle of each space between the cuts by common flattened wire staples, driven across the spring wire. The whole, boards and springs, are now laid in place and supported on the cross bars below, their ends being bolted to a 3 x 4 inch crosspiece across the upper edge of them to hold all together. On top between the boards and glass, a single thickness of common felt cloth is placed; more is not needed, and may be a damage where fine contact is required. On examining the drawing, four wheels on ⅞ half round iron tracks, 1¼ inches thick and six inches diamater, are seen on the under side, set on solid axles ⅞ inches diameter in brass boxes, for moving the printing frame into the sun. These are placed, one pair as near the back or inside end as possible, and the forward or middle pair just about ten inches forward of the middle of the frame, or so that the frame will nearly balance when lifted at the back end. This arrangement is for turning the water off when used in rainy weather, or inclining it to the sun when the frame of 2 x 4 inch stuff, having a 3 x 4 inch piece in the middle, is rolled out of doors on the turntable. The turntable is a little through which a ¾ inch bolt or pin passes, on which it turns on a washer in the middle (higher than the edges), so that when balanced, it can turn sidewise easily, into the desired position for tilting up, as shown in the figure "in the sun." On the lower side of the sash in this position, there are several holes bored in an oblique direction through sash, allowing the water from the glass to run out from the face to the under corner below. The frame when balanced on the turntable is pushed a little further forward on the tracks, and now out of balance on the washer,

cannot be turned by the wind or otherwise. It is now held up by a prop on a hinge on turntable and a hook over the after axle, so that no damage can come to it by wind and it can be set face to the sun all day long in any direction desired. It is so easily handled that a little boy eight years old can use it. On the figure shown "in the sun," are seen two boxes, one at each end, used for printing drawings longer than the glass in clear weather. One edge of the tracing is pinned to the paper; the glass is raised up (see dotted lines on "printing frame inside") and held up by a stick, movable on a screw in its lower end; one of the box lids, say the inside or rear one, is opened, and a thick piece of paper is laid over the edge of the box and on to the printing pad. The surplus paper and tracing are now folded



PRINTING FRAME IN SUN.

up in a serpentine fashion in the box and another thick paper laid on top between the box and sash to keep the light off the paper in the interspace, then the free end is laid on tracing and sensitized paper below, the sash is let down and examined to see if all is straight and in place; if so, it is pushed down and locked by the hooks on the front edge of sash and rolled out doors; but before doing so, a round edged board is laid on a marked line at the unprinted end. When printed the frame is brought in, the printed portion folded same as before, placed in the outside or empty box, the spaced below and above, between box and sash as before, and the round edged board placed on the glass exactly over the printed portion. On the opposite end of the glass, use a similar board as at first, and continue the operation

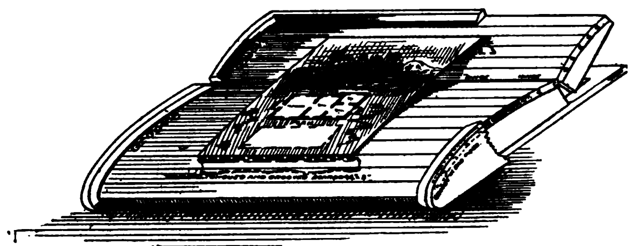
moving the printed portion into the outside box as fast as printed; a print fifty yards long can be printed, if properly arranged on a dry sunny day. The printing frame for this use must be horizontal. When not required for such a use the boxes are removed and hung up inside the printing room. Care should be taken to leave the boards lying across the glass so that their edges point straight to the sun, and the frame turned accordingly. Similar prints may be made without the boxes, by using thick roles of drawing paper and india-rubber bands, and stuffing their ends with a bundle of cloths or towels, having the rolls longer than the print is wide. We made one in that manner twenty-seven feet long. All large tracings should be allowed to remain in the frame a few minutes under pressure before placing in the sun, and then before printing the frame should be opened and closed again to allow the wrinkles and contractions to adjust themselves to the glass, otherwise it may creep when exposed and damage or lose the finer lines. The pressure we give the frame above described, is equal to the weight of two ordinary men, one sitting on the middle at each side of the sash, and the bearings and hooks marked and adjusted accordingly. The tracings are held in place over the paper by thin tapering laths of ash or hickory, the sash lowered nearly down, catching the back side first, when they are drawn out and the sash hooked down.

If it is necessary to examine a print, as for other kinds of printing than blue printing, one of the spring joists can be unhooked from the ends on the underside, and one of the boards hung on a hinge, when the print can be examined the same as in any frame. In blue process this is not required, as the printer judges by the margin entirely (of a cinnamon brown in the formula given) and soon learns when fully printed, while using tracings. But when negatives are used he must examine them from time to time, the same as in other processes. On the above and following printing frames there are no patents, but free to all who wish to use them, having been in public use more than the time prescribed by law, so we yield to the inevitable and present our nurslings for adoption by the brotherhood photographic.

To those desiring a cheaper method of making a printing frame, we commend the following, without glass, shown in the drawing:

It will be found useful by engineers in the field where glass

would be broken, if of any considerable size. Two end boards having an arch shaped groove, secured to a hinged frame at the back, have placed therein the ends of some loosely fitting tongued and grooved boards, the surface of which are formed to the radius of the curve (three or four feet). Each board is about three inches wide and supported loosely on a bridge at the middle of the back, same shape as the grooves.



PRINTING FRAME WITHOUT GLASS FOR TRACINGS.

About one-third of the width the frame is hinged. The edge of the tracing is now slipped through any crack in the tongue and grooves corresponding to its width. On the narrow side near the edge several of the boards are of different width, say 2½, 3, 3½, 4 inches, etc., differentially, so that one edge being placed therein will fall well in place in some one of the cracks opposite or beyond the hinges in the frame (not on boards), the paper being cut a little narrower than the tracing; but one end may be a little longer than the tracing to enable judgment on the printing as it proceeds; such a contrivance in good weather will work well, except that all tracings not under pressure will creep and not be as bright and sharp as they are under glass. It should be said that the tracing above can be stretched at will by pushing the board closely, allowing the tracing to slip easily, though firmly, through the cracks between the boards until the desired tension is given, and then bringing the hinge down and and locking it at the back to the frame.

4. *Drawings and Negatives* for blue printing should be carefully made on tracing paper or linen, with good india ink (or Japanese). Many draughtsmen are careless about their ink, grinding in the little porcelain saucers seen in all draughtrooms. Throw them all out of the window and get you a good slate slab, with a hemispherical hole in it 2½ inches diameter and ¾

inch deep, top flat and covered with a piece of glass or otherwise *air-tight.* For it is necessary to rot or sweat ink after it is ground from ten to twenty-four hours, in order that the gelatine in the ink may perfectly dissolve—new ink is full of little cheesy lumps which clog the press and break in the fine lines; but by this procedure, it becomes of uniform fluidity, flows well when renewed each evening and is good as long as it shows a black slimy margin in slab. Ink for making washes should be new, but the older for writing purposes is best. The Japanese is waterproof and for washing over with colors, good, but for lines, does not work so well as the india ink described for lines that may be made with it, even of microscopic fineness. But lines for blue printing should be firm and coarse, as they loose something in the width of them, owing to the thickness of the cloth.

A few drops of acetic acid added to the water in the dropping bottle for mixing ink, aids materially in dissolving the gelatine, makes the ink tougher and helps it to flow well. It is well to introduce some red color in ink, as it retards the actinic power of the light when the ink is thin, though it is really better to have a care and make good black ink as first described.

Negatives intended for blue printing should be "thin," about half way between a good solar and a silver printing negative, by this it is not meant that it should be flat, but clear and not so strong as for silver printing. Negatives made on blue paper from tracings should be of the thinnest paper, sensitized on both sides, then strongly printed and washed; when dry, make it transparent by rubbing vaseline, a wax solution or wax chips melted by a hot iron or varnish for paper, when it may be printed from, yielding blue lines on a white ground, fairly good. The printing requires about twice as long as a tracing, and will be found useful where coloring is to be done afterward, or additions made to a print.

The color of blue prints may be varied by immersing in alkaline baths, having previously been washed in cold water. The baths are usually weak, unless bleaching entirely out is desired when they are strong. The first action of weak alkalies is to bleach the whites, and strengthen or darken the blues. This is taken advantage of when using ammonia or bicarbonate of soda, the latter a saturated solution, one part to eighty parts of water, blue black; chloride of lime one part (saturated solution) to 120 water, nearly black; strong sal soda

solution to bleach, rebathing in a solution of tannin in water, the print returns to a pretty brown color, resembling a plain silver print; bleached in ammonia and bathed in a solution of gum catechu and borax, a slaty blue color, etc.

To clear and set a blue print, to improve the blue color, the following is good, simple, cheap, and as reliable as any other:

Aq. Saturated Solution of Alum	1 oz.
Water	32 oz.

Previously wash the print well in plain water; but a strong solution of salt water seems good frequently. Be sure all the soluble material is out of the paper or the blue will set all over when placed in the alum bath and cannot be removed afterwards. If the alum bath is seen to be at all blue or not clear, throw it away and make a new one. Bath trays or sinks should be not less than three inches larger than the prints when lying flat, and should be two in number; one for the first dip or soaking of surplus material from the surface in plain water, and another to complete the thorough soaking and washing required.

Blue prints when well washed are durable, and if any fail, it is the failure to wash them well. I have some that have been in strong light for many years, yet show no trace of fading or change. A print never should be taken out of the water under an hour and, if a good print, may remain four or five hours without damage. If a print fails in washing, the chemicals or printing are at fault and not the washing. The washing is the best when the cold water of Winter is used, that is, the prints are better than in Summer, all the other conditions being similar.

THE CALOTYPE PROCESS, AND HOW WE PHOTOGRAPHED IN THE "FIFTIES."

*By H. D. Taylor.**

I am indebted to the Hon. Arthur Kerr for my introduction to photography. In the year 1853 he was staying in my neighborhood (Godalming), and as he had just been taking lessons from

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*Thirty years ago Mr. Taylor stood in the front rank of English photographers, the contemporary criticisms on his work in the *Athenæum*, *Art Journal*, etc., certify this.

Mr. Buckle, of Leamington, in calotype, he offered to instruct me in its mysteries. On the principle "*palmam qui meruit ferat,*" I should prefer to call the process "Talbotype," as Mr. Fox Talbot was its author.

I was anxious that my success should not be marred by the use of imperfect instruments, I therefore procured from Ross a camera to take pictures 8½x6½ inches, with two double backs for paper, a landscape lens 2½ inches diameter, stand, etc., costing about £16. I had prepared some paper, and on the receipt of my apparatus August 1, 1853, I produced my first picture, which was tolerably successful. I will describe in detail the process I adopted: First, to make iodized paper: The method I first used was to wash over the paper, cut a little larger than the proposed negative, with a solution of nitrate of silver, 30 grains to the ounce, and when this was absorbed it was put in a bath of iodide of potassium, 20 grains to the ounce; then thoroughly washed to free it from nitrate of potash and hung up to dry. A better method which I subsequently adopted was to use a double iodide of silver and potassium made thus: Dissolve separately in distilled water 60 grains each of nitrate of silver and iodide of potassium; mix and allow precipitate to subside; wash it in several waters, add 4 ounces distilled water and 600 grains iodide of potassium, or sufficient to redissolve the precipitate. The paper I found best for negatives was Turner's, made at Chafford Mills, near Panhurst. This paper, and I believe most English papers, are sized with gelatine, the foreign papers with starch, and I attribute the superiority of the former to its containing gelatine. The paper being cut to the size somewhat larger than the proposed negative, have a board larger than the paper covered with flannel on one side, on the other side a piece of webbing nailed on, to put the hand in.

Lay a piece of white blotting paper larger than the negative paper on the flannel; on this, the negative paper, pin with silver pins the four corners to keep the whole firm. Then take a thick glass tube like a test tube, but open at both ends, and a thick piece of silver wire longer than the tube, with a hook at one end and some cotton wool quite clean. Take a piece of the wool, say about the size of an egg, and with the hook catch the middle of it and draw it about an inch into the tube. Trim the tuft of loose fibres, and it is ready for use. It will form a most convenient brush which has frequently to be used in the process. It

was the invention of Mr. Buckle and was known by his name. Its advantages are obvious. There is nothing to disturb the chemicals, and a new brush can be made in a moment. Some used a glass rod and other contrivances, but nothing can be better than Buckle's brush. I recollect having a ***brush*** with Dr. Diamond on this subject in one of the *Journals*. Pour into a glass measure a small quantity of the double iodide solution; 1 ounce will cover 10 pieces 8½x6½. Saturate the brush and wash over the paper, beginning at the top, by broad strokes to and fro horizontally, and finally in the contrary direction. Lay aside for a short time and let the paper absorb the solution; then place in a large dish of clean water and change it several times to free it from iodide of potassium. Several sheets may be put into one dish, but they must not be allowed to lie close together. The iodide of silver remains in the paper and colors it a pale primrose color.

My paper generally remained in the water all night, and was then hung up to dry. Light does not affect it; on the contrary, we were in the habit of exposing it to the sun, under glass, for some hours. I cannot say if this was ***necessary***. Each sheet should have a pencil mark at the back, because the iodized surface is not easily distinguishable in a yellow light.

The next step is to excite for camera, which must be done in a yellow light. Cut the iodized paper to the exact size of the holder.

Take the board with a clean piece of blotting paper on it and pin a piece of the iodized paper by the four corners on it. Make the two solutions following:

Nitrate of silver	50 grains.
Distilled water	1 ounce.
Acetic acid	80 drops.

Call this Solution A.

Gallic acid	10 grains.
Distilled water	2 ounces.

Call it Solution B.

Take 2 drachms distilled water, add 6 drops of Solution A, and then 6 of Solution B. Do not mix the two solutions till one is diluted with water. This quantity is sufficient for 2 pieces 8½x6½. Brush over evenly, leave for half a minute and blot off with *clean* blotting paper; place in the holder. In backs intended for 2 pieces of paper, place a piece of *red* blotting paper

between the two, taking care that the sensitive surfaces are next the glass. The time of exposure, subject of course to amount of light, was 4 or 5 minutes.

To develop picture: Take of Solutions A and B equal parts; about 40 drops of each are required for 2 pictures.

Should the negative be visible beyond a pink sky, wash over first with Solution B. Pin the negative on the board and proceed to wash over evenly with the brush. When the development is nearly complete wash over finally with Solution B.

Then wash in three waters and set in a solution of hyposulphite of soda, 1 ounce to 20 of water. When free from yellow iodide, wash in several changes of water to take out hyposulphite of silver. It may then be hung up to dry, or at once freed from size. For this purpose place it in a shallow porcelain dish and pour boiling water over it. When transparent hang up to dry, or remove the water by blotting paper. When dry iron with a box-iron. Hold the iron in the right hand, and in the left a piece of white wax; melt the wax with the hot iron and saturate the negative with it; remove any superfluity by ironing it between sheets of blotting paper. It should then be almost as transparent as glass. The final step is to print from these negatives.

I had a great objection to albumenized papers and printed my proofs in manner following: Salt any good paper with a solution of chloride of ammonium, ½ a grain to each ounce of water. When dry, pin a piece on the board and wash over with Buckle's brush the following solution:

Nitrate of silver	30 or 40 grains.
Distilled water	1 ounce.

When dissolved add solution of ammonia sufficient, after precipitating oxide, to nearly redissolve precipitate.

Fix in bath ½ ounce hyposulphite of soda to 20 ounces of water and tone as usual.

I claim for calotype several advantages: First, for cleanliness —there is no need for dirty fingers; next, no necessity to work in darkness. One or at most two thicknesses of yellow calico are sufficient during any stage to keep out excess of light so that the development can be pleasurably watched. I have frequently had quite a bevy of ladies looking on during the development of my day's work. Further, the development can be very much controlled—parts which are slow in making their appearance can be

stimulated with a few drops of Solution A, and when it is too rapid can be retarded by a wash of Solution B.

I had a camera made for pictures 15x12, and the process is as easily worked as in that I have described. I made comparatively few pictures with it; other engagements prevented my pursuing it.

I took with me on an excursion 4 pieces of paper sensitized in two double backs, which I carried in a flannel bag with two divisions by a strap over the shoulder. In very hot weather I wrapped the whole in a woolen shawl dipped in a brook and wrung out to keep it cool. The negatives were generally developed in the evening by the light of an ordinary candle.

When taken out of the backs the sky is generally of a light pink color; if much detail appears it is a sign of over exposure. As this is a slow process, calm weather is most desirable; the best time to insure this is about an hour after sunrise, and in this way I have been able to take sharp negatives of leaves and corn, although the exposure was 5 minutes. Calotype and the modern methods may be compared to traveling in the old time and to-day; the former in both cases is, I think, the pleasanter. I have had a large experience in photography since collodion drove calotype out of the field—in the exhibition of 1861 and two journeys to France—but the early days have the most agreeable reminiscences. In addition to exhibiting my pictures in London, Edinburgh, Norwich, Manchester, Cheltenham, etc., I sent some to Brussels in 1856, for which they awarded me a medal.

I made large quantities of iodized paper for amateurs; a Mr. Raven ordered 300 pieces 12x10 to take with him on a continental trip. Among the workers in calotype at that period were the following:

Dr. Diamond,
Dr. Percy,
Rev. J. R. Major,
Rev. F. A. S. Marshall,
Rev. T. M. Raven,
Rev. J. Winter,
The Hon. A. S. Kerr,
C. Innes, Edinburgh,
G. Moir, Edinburgh,
A. Rosling,
B. B. Turner, etc., etc.

A GOOD HYDROQUINONE DEVELOPER.

By H. G. Thompson.

As an outcome of many experiments with "hydroquinone" as a developer, more especially for lantern slides, I find the following formula a first rate one. It is easy to make up, keeps well, works easlly, gives good tones, with the fullest amount of detail, and allows of the greatest latitude in exposures. A given quantity will develope from twelve to twenty lantern slides one after the other without any alteration being necessary, but, of course, the action is slower after the first ten or twelve plates have been completed.

Make up two solutions:

A.

Hydroquinone	100 grs.
Sodium sulphite	400 grs.
Water to	10 oz.

B.

Potass. carbonate	300 grs.
Sodium sulphite	200 grs.
Water to	10 oz.

Use equal parts of A and B.

Bromides are not necessary.

Use alum bath and fix as usual.

MY EXPERIENCE WITH FILMS.

By H. N. Tiemann, School of Mines, N. Y.

In anticipation of a trip through some of the Southern States last Winter, I began, as what an amateur photographer does not, to consider what plates and camera to take.

I finally decided to take only my 3¼ x 4¼ "detective" box and Carbutt's films, which latter had only shortly appeared on the market.

My camera is furnished with the Barnett paper holders, which I fixed for receiving films, by gluing in sheets of pasteboard, which I painted a dull black, as a backing. Then I tacked short strips of thin sheet iron (I used an old ferrotype plate) across the two inside corners of the depressions which receive the plates. The corners of the films are caught under these and are thereby prevented from sliding all about the holders.

For developing the films I prefer the Beech developer for both time and instantaneous work.

I develop until I can hardly see the image, as I find it "fixes out" somewhat, besides which the film itself has a tendency to deceive, as it is always more or less opaque, and on looking through it before fixing the image looks denser than it really is.

It is claimed there is no halation with films, but, while generally true, it is not so altogether, as several times I have obtained a very distinct halation, notably in a negative I took of the Natural Bridge, Virginia, where it shows nearly as strong as it would on glass.

Several of my friends have complained of clear spots in the films which appear after development and for which no adequate reason has been given. I am happy to say that so far my films have given me very little trouble in this respect.

Taking everything into consideration the films have more than paid me for the difference in cost between them and glass. It is a great comfort to be able, when a plate slips out of your hands, to pick it up with a calm certainty that no harm is done. Then the great decrease in weight is a boon which appeals to all travelers.

A WORD TO INVENTORS.

By Alban E. Thorburn, Uddavalla, Sweden.

When Daguerre was working at his invention, his wife firmly believing that he was going mad, went to a doctor and explained to him that her husband had got a fixed idea into his head, that he could take the image in a camera obscura on a silver plate and carry it away with him. The Doctor, we are told, was quite convinced of his insanity, and surely sixty years ago the idea seemed quite absurd as well to a learned doctor as to any one else.

But nowadays, when we have machines that talk, that calculate, that sew and spin, that read and write, it does not at all seem strange that we have an instrument for taking sketches and portraits better than man. Observe closely such an everyday instrument as the sewing machine, and you cannot help admiring the ingenuity and accuracy of its inventor. Also look closely at a *photogram* (this is the most ultra fashionable word for it!) and you will be filled with admiration at the wonderful

ingenuity and perfection with which the physical and chemical laws have been made to act.

It is, therefore, only natural, that among the laymen who only see the marvelous results of the art, some little exaggeration should find its way here and there. Once, I remember, a photographic apparatus was described to me, which certainly was the tip top of handiness. It was said to consist simply of a certain plate the size of any ordinary card. When you wanted to take a picture, all you had to do was to hold up the plate in the air, facing the view to be portrayed (like you can see a landscape in a mirror), and *voilà* there you get the whole photograph exactly as you wished it !!! But this apparatus, although its simplicity may seem novel, is as nothing compared to the *phototelegraph*. As the name gives to understand, this is a perfection of the telegraph or telephone idea, but instead of conveying the electric spark or sound, this apparatus gives us the *view* from the other station. I regret that I am not in a position to give you the details of its construction. The first time this invention was practically inaugurated, was at a race course some 100 miles from Adelaide (Australia). The community of this city was enabled to follow the whole race although so far away, and the effect is said to have been remarkably striking !!!

Those who can give further particulars regarding this, will oblige by sending them to the editors of *Anthony's Bulletin*.

But there is still one point which baffles the skill of the inventor at present, and that is "photography in colors."

The beauty of the image in the camera is no doubt to be ascribed to its brilliancy, and the fact that all lights are really lights and not opaque white or light colors, as in paintings, and that the shades are really of a deep dark. Chrystoleum and its relatives approach to the desideratum, but in these also the light is lacking.

Now, it is well known that when heating a piece of steel it gradually assumes almost all the colors of the rainbow. By experimenting and practicing I believe one would be able to obtain almost any color. The heating could be done by electricity as in certain instruments. Then transfer a photograph of neutral tint color to a polished steel plate, and heat the different portions of sky and water, etc., exactly the shade you want. Owing to the polished surface underneath, the lights will appear as really clear lights, and the colors will show a brilliancy and

depth, although no details of the photographs will be changed in the least.

If there is anything in this idea, I should be happy if someone took it up and carried it out.

COPYRIGHT.

By Wm. I. Topley, Ottawa, Canada.

Nearly every detail in photography as an art or as a science has been written upon so exhaustively that there is little else left to us than to remind the fraternity of something apt to be overlooked or forgotten. One of these is copyright.

Many years ago our work was spoken of by artists in general, by painters in particular, in terms of supreme contempt; and even when they began to use photographs as studies or helps they chose to allude to them as works of the hand rather than those of the brain, in fact to be the work of the "masheen."

Even at this day we frequently are pestered by the criticisms of the "photographically ignorant," who treat our work as if the camera had been dropped by accident and suffered to "strike off" the view, as they so accurately express themselves, never dreaming that the unfortunate camera-crank has spent hours, perhaps days, in deciding the points that led up to a successful composition, and who has, perhaps by the sweat of his brow, brought together such objects as were necessary to the finish of an effective foreground.

This introduction brings me to the point. Is it not time that there was some recognition of our right to our own work? Ought there not be a copyright law that would protect each photo we publish? That would save us from the stealing of the artist of every kind, the copyist, the painter, the lithographer, the photogravurist, and the host of other pirates who prey on us.

Let me give you an instance or two. Just the other day a gentleman called me from my work to know if I had something very good that would illustrate his magazine article. If it came any where near the mark he could write up to it, etc., etc. He did not hint about copyright; the sale of the print, the receipt of the twenty-five cents settled that matter. I suggested the propriety of engaging an artist to do his work. Oh no! that would be too ——— expensive. All this being said in a pompous tone that

indicated he was doing a favor to the poor photographer, and yet he wished for something that I had done for the love of my art, not a mere commercial view.

Again, not long since (one of many instances), I had obtained, by hard work, a sitting from a prominent man; making a characteristic and more than ordinarily successful portrait. A lithographer, or photo-gravurist, steps in and robs me of the result of my thought, skill and labor, without saying by your leave.

Now, I do not write in any narrow or selfish spirit; I have experienced the unalloyed pleasure of giving copies of my pet negatives to friends, to be used for commercial purposes. To friends who knew my habits of thought and methods of working, who could see where artistic inspiration had made a slave of mere mechanical skill, where knowledge of the possibilities in photography had turned apparent failure into a triumph. Rather do I wish to draw attention to the facts that our work is held to be public property; that while the work of the brain of others is protected by act of Parliament and Congress, we cannot seek any help under the limited powers of present legislation. Is it not time that our laws received a broader interpretation?

Some wiseacres will say that this state of things is of our own doing. Well, certainly, it is evolved out of the early environment of our art. At first being neither a business, an art, or a profession, it was taken up by shiftless adventurers, who desired an easy living, but the growth of years will define its position more correctly. To-day the masses support cheap men who speak to them photographically in a language they best understand. There will be such always. An aspirant to such honors applied to me recently to know how long it would take me to teach him. I was not hard on him but said that after an experience of nearly thirty years I was just beginning to know something.

To stand in the front rank requires, beside experience, a love for the beautiful, an artistic talent, close application, exhaustive work, and some money; those who by earnest work lift our art into the higher sphere, should also see that their old days are provided for.

Too often the true spirit of the artist induces us to love art for art's sake. Too often are we fascinated by the beauties of face and form that reveal themselves day by day; and lost in this spiritual delight we forget the sordid side, until we are rudely

awakened to business by some such unpleasant fact as those given. It is bad enough to find one's best efforts unappreciated, perhaps quietly smiled at; it is simply annoying to see the worst proof chosen and good negatives going into the potash bath, but it is inexpressibly galling to see some of our supreme efforts appropriated by those who tell us we have no right.

In conclusion, the only difficulty in this matter is the question of the ownership of the copyright. There can be no question regarding views. In portraiture, unless otherwise arranged before the negative is taken, the photographer should have the right. A recent decision in England gave to the photographer the ownership of the negative, but gave the sitter the right to prohibit publication of copies. This is quite correct, and permission to sell can be obtained by the photographer. But should it be necessary to do so, the photographer should have the power to prevent the sitter from allowing his photo to be used for business purposes, because a successful portrait is the result of the talent of the photographer and is to all intents and purposes his.

ON DEVELOPMENT.

By A. J. Treat, San Francisco.

Chapters have been written upon the development of dry plates. Thousands of formulas have been published by enthusiastic advocates, yet the number of poor negatives produced daily is sufficient excuse for the following suggestions intended for the eyes of beginners :

Satisfactory and identical results can be obtained upon any good plate with any consistent formula, if its action is understood. Pyrogallic acid, when made alkaline, has the property of decomposing water by the absorption of its oxygen. The hydrogen thus liberated unites with the bromide of silver contained in the gelatine film, and where it has been affected by light forms metallic silver, or the image we find upon the plate after development. What the precise action of light upon the film is we do not know. Whether it is a chemical or physical change has not been decided. That problem is for scientists. What we are most interested in, and what we should comprehend, is the degree of action of each solution of the developer.

The English prefer ammonia as an alkali. In the United States

carbonate of soda and carbonate of potash are used. All such chemicals answer the same purpose. The argument against the use of ammonia is that it looses strength with age, and is therefore unstable. Were it not for their corrosive action, caustic potash or chloride of lime could also be used. The color of a plate developed with carbonate of soda is generally gray or black; that of a plate developed with carbonate of potash, brown or yellow. The former is generally preferred for portrait negatives, as negatives so developed print with a softness desirable in portraiture, but which in a landscape negative is apt to lead to flatness. To illustrate: I once saw a number of negatives of scenes around Mt. Shasta. They were most agreeable to look at, but the resulting prints were not so fine as the negatives seemed to warrant. About the same time I also saw other negatives of the same scenes developed with potash; they were not so pleasing to look upon, but they gave pictures of greater snap, what some call "pluck." My own experience leads me to the opinion that this is the difference between the two developers. Personally, I prefer the potash, because with it I can produce with greater certainty either strong or soft effects by certain manipulations. But the fact is, any developer will produce the result desired in the hands of one skilled in its use, and if a photographer is satisfied with the results he obtains with the formula he has adopted, by all means he should cling to it.

I give the formula used by myself, that published by Dr. S. C. Passavant, of San Francisco, for his excellent plates, not because I know it to be better than others, but for the purpose of illustration:

Distilled Water,	8 ounces.	Carbonate of Potash,	8 ounces.
Sulphite of Soda,	2 "	Sulphite of Soda,	2 "
Citric Acid,	60 grains.	Distilled Water,	16 "
Pyrogallic Acid,	1 ounce.		

Standard developer: 1 dram of each to five ounces of water.

In the development of the image one must bear in mind the fact that pyro is the steam, the power; the alkali, the fire that starts it working. Each operator may have a different mode of development, and though it may be radically different from the method employed by another, the results may be equally good. One will start with pyro first and add alkali, and *vice versa*. The method practiced by the writer is simple and effective. Each and every plate is started with the full amount of water and

one-fourth the amount of chemicals. The action of this weak solution is slow; one is enabled to exactly determine the requirements of the plate. The main thing to be considered in development is the appearance of the plate, aud to know what it requires; then it only remains to do what is necessary to correct errors of exposure, for no one can, in all cases, time the exposure just right. Under exposure can probably be corrected up to 20 per cent.; over exposure up to 200. That is, a plate with that percentage of under or over exposure can be brought up to a proper standard. If with the weak developer suggested the plate comes up all right, the remainder of the pyro and potash are added in equal proportions up to the normal quantities. If the details are slow in appearing, not quite the normal amount of pyro is added, for that would tend to make the high lights hard—and from one to *four* times the normal quantity of alkali, according to the percentage of under exposure. After all the detail is brought out, should the plate lack strength, sufficient pyro is added to bring it up to the necessary density.

Should the plate come up too rapidly, the developer is poured into the graduate *at once* and the plate covered with water. This allows time to mix up a developer suitable for the difficulty. If the image has flashed up, it is necessasy to add bromide of potassium (50 grains to ounce of water), five to twenty minims, according to the degree of over exposure. Some operators never use bromide. It is possible to correct an over exposure with pyro, but it has to be added in such large quantities, it is not an economy of time or material. Bromide simply stops development in the shadows. More energy is necessary to increase the density of the high lights, which appear flat, so more pyro is added; one, two, three, or even *four* times the normal quantity. There is sufficient alkali in the first solution to set the pyro working. A trifle more may be added if the action of the developer is too slow. If one is sure a plate is overtimed, this method, or a variation of it, according to circumstances, can be adopted, the result being, of course, that the plate, controlled at the very outset, comes up as if the correct exposure had been given. This is the proper course when the view has been timed for a small stop and by oversight the stop used in focussing has been left in.

In the development of any plate it should be borne in mind that alkali gives detail, pyro over the normal quantity density, and that the addition of bromide checks the development of the

shadows, allowing the pyro to go ahead on the high lights, and the more pyro added the greater is the density of the high lights. If the development be long continued the shadows gain a little, but not in proportion to the high lights. The high lights of an undertimed negative are usually dense. This is because they have received sufficient time. The shadows, however, have not been impressed upon the plate, and can develop only to their limit. An overtimed negative can always be saved, a really undertimed one never. If one is satisfied a plate is under exposed, it may be helped without danger of clogging up the high lights by first soaking for a time in the alkali solution. This impregnates the plate with alkali and enables the developer to act strongly on the shadows.

The most satisfactory plan for the development of under exposures of plates in which a great amount of detail is required, and also when valuable exposures are to be brought out, is that of prolonged, weak development. If by this process they show tendency to yellow stain, the addition of a small amount of sulphite of soda to the developer will prevent it. Prof. Burnham, of the Lick Observatory, an amateur as skillful as enthusiastic, uses a rocker operated by clock work. His plate is covered with a very weak developer, placed on the rocker and covered. The Professor continues his astronomical observations and returns to the plate at long intervals. His photographic work is remarkable for detail and softness. The use of mechanical contrivances for rocking will no doubt increase, as they save tedious waiting in the dark room, time which can be utilized for other work.

The foregoing suggestions are for time exposures on portraiture, interiors, landscapes, etc. For snap exposures a different course is necessary. In shutter work on landscapes or figures, a plate is rarely over exposed, so it is best to start with the normal quantity of alkali and half the amount of pyro. This allows detail to be forced without clogging the high lights. But in marine work the high lights are illuminated so far beyond the shadows, it is necessary to keep them back. This is best done by starting the plate with a normal quantity of pyro and one-fourth alkali, developing until the shadows are nearly out; then the addition of the remainder of the alkali up to the normal amount brings the plate up to the requisite detail, snap and density necessary for good marine pictures. Should the image come up too quickly and look flat, two or three drops of bromide will give the

required pluck. And if, on the other hand, the shadows are backward, from one to four times the normal alkali can be added. With the plates and developer mentioned this amount of alkali can be used without so called chemical fog, and I presume can be with any good plate, providing it is kept as much as possible away from the dark room light.

It can hardly be said that hydroquinone has passed the experimental stage. Experts do not as yet agree upon its powers over pyro. Its advocates say it can be used again and again. That is an argument against it. A developer used once or more is weakened. Its precise action after the first plate is hardly known. If it be strengthened, it is both before and afterwards an unknown quantity. A pyro solution, freshly mixed for each plate, is always of a known strength, above or below a normal standard. It is made to suit the requirements of a plate, and when used is thrown away. Hydroquinone, like any developer in the hands of a skillful operator, will give fine results on some subjects. It is apt, though, to clog those negatives requiring long development to bring up shadows; therefore, it is not so good an all round developer as pyro. With any developer, the point always to be borne in mind is the relation of the shadows to the high lights, and the developer is best which at command can be made to secure this balance.

I once asked a very skillful manipulator if he was sure of the point at which to stop in developing; if he could decide, without hesitation, when the plate was dense enough and balanced by the detail. He replied in the negative and that he did not think any one could. To bring the high lights and shadows into harmony is the result to be attained, and is the science of development. It can only be accomplished when the action and the limitations of each solution of the developer is understood. Though it is impossible for the most skillful to invariably and exactly determine when a plate is ready for the hypo, success is achieved if it has been brought as near as possible to sufficient density and sufficient detail, each balancing the other.

PRODUCTION OF FOCUSING SCREENS.

By G. W. Valentine, Southampton.

It has been my misfortune on more than one occasion to be so unfortunate as to break my focussing screen—and, of course, as

LUNCH ON THE KESSELWAND GLACIER.—TYROLESE ALPS.

Negatives by Prof. D. L. Elmendorf, New York. Crosscup & West Eng. Co., Phila.

UP THE VENTERTHAL.—TYROLESE ALPS.

it always will happen—just previous to going out on one of my lengthened landscape tours, and being unable to purchase a screen of the required degree of fineness in the locality wherein I live, I have been obliged to put my wits to work in order to get what I wanted.

Having in years gone by a great quantity of emery and rouge residues, left from the production of specula for astronomical purposes, I thought I could not do better than utilize some of these waste materials. So to begin, I accordingly fished out from among a lot of other requisites a piece of thick sawblade ⅛-inch thick and six inches square, and cemented a wooden handle with pitch in the center of it. I next secured an old negative with a piece of thick cloth under it to a table top with tacks driven closely round and below the edge. I then damped some No. 1 emery, and applied a little to the center of the glass plate, and worked the piece of sheet steel in every direction for five minutes all over its surface, until all the polish of the glass had been ground entirely off. After thoroughly sponging off all the coarse emery, and being sure of getting rid of all the coarser particles, I proceeded to treat the surface of the glass with finer grades of emery of two degrees of fineness, and afterwards washing and drying. I then had a focussing screen second to none for fineness of grain, and only occupied fifteen minutes to do it. The surface appearing as if a very attenuated film of milk and water had been flowed over its surface. The chief point to attend to in the first place, is to use a grinder of some harder material than glass, such as steel or iron; and, secondly, to use emery of a medium grain, in order to quickly cut off the polish.

"THE ART OF LYING" AS APPLIED TO PHOTOGRAPHERS.

By C. C. Vevers.

Oscar Wilde, in a recent number of an English magazine, favored his admirers with an essay, in his well known peculiar style, on "The Decay of Lying," in which he endeavored to show, with many regrets, that lying, as a fine art, is fast falling into disuse.

It is evident from this article, that Oscar has never been fortunate enough to make the acquaintance of that portion of

humanity known as "the photographer" or the photographic material manufacturer, with whom "lying" has, indeed, been reduced to a very "fine art."

In no other business or profession—if, perhaps we make the press an exception—has "innocent prevarication" been made the subject of more careful study, and its due effect on the public recognized, than with the brethren of the camera. Yet there is a certain want of originality in their assertious that is apt to pall; and as familiarity is known to breed contempt, so do repetitions fail to fascinate.

Fearing, therefore, for the reputation of "the profession," so assiduously built up by themselves and predecessors in former days, I venture to point out a few—a *very* small proportion—of the announcements which are becoming *rather* too common, in the hope that my readers' well known ingenuity in this direction, will devise a few novelties and thus save an honorable profession from a slur on its character.

"Children taken instantaneously by a new process," (with 6 seconds exposure) has lost its point of attractiveness, as it has become possible *at times*, to actually take children instantaneous ly. Now this is verging too much on the borders of facts, and should consequently be avoided.

"The best appointed studio in the States," (or kingdom as the case may be), does not have the recognition it deserves from the public, and can safely be omitted in future.

"Photography in natural colors" has been cruelly exposed by its discoverers—the newspapers.

"Permanent photographs" should be offered by those who work the albumenized paper *only*.

"Sole inventors and proprietors of Byng's 'Platinograph Process'"; "Portraits taken at night by the New Electric Light" (magnesium ribbon); "Biffin's Celebrated Parisian Studio, patronized by Pope Leo XLIV. and Fred Archer;" "Satisfaction guaranteed or money returned"; "Portraits taken direct up to life size"; would not stand copywriting.

As to the promises a photographer will make if he once button-holes a possible customer, they would require more pages to enumerate than this already bulky annual contains. The marvels of photography in general, and his own "processes" in particular are astounding, and would make the most advanced amateur blush at his ignorance and his hair stand on end when

he hears the bare possibilities of photography when undertaken by the right man. While the photographer's explanation of the numerous defects visible when the photograph *is* finished (always a few months after the date promised) say much for his ingenuity and his extensive vocabulary of twelve syllable words.

Now for the manufacturers:

We all know that every make of plates (like the daily papers) has the "largest sale in the world."

We are also aware that the plates we use are "60 times" the rapidity of wet plates; yet we stupidly give them a *little* more than a 60th the exposure a wet plate would require, and we ar'n't surprised when we get a good negative!

"Perfectly orthochromatic plates for correctly registering the value of colors without the use of colored screens" are now no novelty on paper, but rather difficult to get hold of in reality.

So also are "perfectly transparent and flexible negative films and paper.

The "only reliable sensitized paper" which "will keep good for months without discoloration" is also prepared by all dealers.

"The lightest and most compact camera in the world" and whether it cost 15s. or £15, it is "made of the best materials and finest workmanship only," is of course included in every dealer's stock. As is also the tripod (be it twofold, fourfold, or tenfold) which exhibits the "acme of rapidity combined with light. ness." While every store offers "our celebrated pyrogallic acid—the cheapest in the trade" and the "purest hyposulphite at 10% less than any other house."

Every maker's lenses embody the utmost perfection in "extraordinary definition, great depth of focus, flatness of field,'' etc., etc. "Equalled by none." And the patentees of "the quickest and most reliable shutter in the market, giving the most theoretically correct exposure, with least vibration." are legion.

But this list might be continued indefinitely (as a reference to the advt. pages will show), and when one comes to think of it, the manufacturer and dealer is an even worse transgressor—ahem! I mean, more perfect disciple of Oscar Wilde's decaying art than the photographer. Besides—but "residents in crystal domiciles are urged to cease hurling missills of concentrated terrene matter."

VIGNETTING.

By H. Rowland Wakefield.

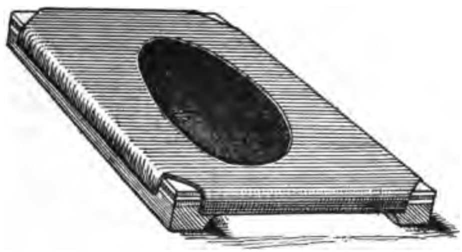
The family album upon the drawing-room table is a never failing source of interest to visitors, and especially to those who, from the lack of original ideas, have but little else to talk about than the weather. In the estimation of the numerous "quizzers" of the said family album, it will be found that the "vignette" portrait takes a prominent position. By means of this mode of printing, the edges of the photograph are softened away, and instead of it covering the whole of the paper, it is confined chiefly to the central portion and gradually shaded off to the pure whites of the edges. There is such a degree of beauty imparted to a vignetted photograph—which otherwise might be a very commonplace one—that it seems surprising that amateur photographers do not adopt the method much more than at present, both for portraits and landscapes.

It may be that they experience a difficulty in attaining the much-to-be-desired end. In the first place, if it to be a portrait, a negative should be obtained in which the background is neither too thin nor too dense, and if a landscape, one that is full of detail, and yet without excessive contrasts. Negatives that are slightly over exposed are capital ones for the purpose.

Many amateurs attempt to vignette by placing in front of the negative—either within the printing frame or on the front of it—a piece of "flashed" ruby glass, the color being intense at the edges and shading off towards the centre which is left quite transparent. But very few good results are obtained by this method, inasmuch as the gradation of the color is frequently very uneven. Others use cotton wool, but this requires some dexterity in its arrangement.

Now, I always get very good results by working either of the following methods: Take a sheet of ordinary cardboard or opaque paper, and cut from its centre an oval or other shaped aperture, decidedly smaller than the picture. I usually determine the shape and size of the aperture by first centering a piece of translucent paper with the negative and then, placing the negative against the window pane lightly penciling the outline on the paper. Cut the piece of paper out, and make an exact copy of the mask in cardboard. Fasten this to the front of the printing frames by means of drawing pins, so that it can be easily

removed and kept for some future time. The printing frame is then placed in a diffused light with the negative facing a broad expanse of sky. Should the printing be done in the direct rays of the sun, it is necessary to interpose some diaphanous screen—such as a piece of tissue paper pasted over the aperture—or else



the print will have a sharp, hard outline. For quarter-plates and half-plates, the vignetting mask should be about three-quarters of an inch from the negative; for the larger sizes the distance should be proportionately greater.

By the other method, I use very thin sheet lead—7 ounce, as it is called. This I find is extremely useful, for the hole is easily cut out with a pair of scissors and the edges of the aperture can be turned back if it has been made somewhat too small at first. The mask should be larger than the printing frame, so that, when once it is in position, it can be so retained by simply turning down the projecting edges as shown in the accompanying cut.

SULPHUROUS ACID AND SULPHITES.

By E. J. Wall.

The daily use of these chemicals by photograpers and the little that is evidently known about them must be my excuse, if any is needed, for the following brief notes on this subject.

Sulphurous Acid—As met with in commerce is actually an aqueous solution of the acid, which is made by deoxidizing sulphuric acid by means of charcoal by the aid of heat when the following reaction takes place:

$$\underset{\text{Sulphuric Acid}}{4\,H_2SO_4} + \underset{\text{Carbon}}{C_2} = \underset{\text{Sulphurous Anhydride.}}{4\,SO_2} + \underset{\text{Carbonic}}{2\,CO_2} + \underset{\text{Water}}{4\,H_2O}$$

The sulphurous anhydride is passed through a wash bottle and conducted into water with part of which it combines forming true sulphurous acid.

H_2O	+	SO_2	=	H_2SO_3
Water		**Sulphurous Anyhdride**		**Sulphurous Acid.**

The photographic operator desiring to use this acid for the preparation of a developer, may or may not obtain from his dealer a reliable article, for if the acid has been kept in stock some time, and the bottle has been carelessly stoppered or frequently opened, some of the volatile gas will have escaped and the solution will have therefore become weaker, oxygen will be absorbed from the air and part will be converted into sulphuric acid, which in development would neutralize some of the alkali used as an accelerator, forming a sulphate which is an active retarder of development. When freshly made, the acid should have a specific gravity of 1.040, that is, a volume of acid which will take up exactly the same space as 1,000 grains of distilled water at 60° F., will weigh 1,040 grains. It should also contain about 12 (11.79) per cent. of true sulphurous acid or about 9 (9.2) per cent. of sulphurous anhydride.

The usual methods of testing this acid, I think a little too intricate for the average professional and amateur, who rather eschew the chemical side of photography, but the following practical, though somewhat rough, method gives fairly accurate results, which will enable any operator to judge of the suitability of the materials for his developer; it requires no special apparatus, and no special knowledge. Into an ounce vial put eleven grains of resublimed iodine and fifteen grains of iodide of potassium; on them pour one fluid drachm of the acid to be tested, rinse the measure with a drachm of distilled water, adding this to the contents of the vial; fit a good cork and shake well. If the acid be of full strength the brown color of the iodine will be entirely discharged; but if the acid be deteriorated, and it usually is, then the amount of deterioration may be easily estimated by adding more acid in small quantities of say five minims (not drops) at a time, until the whole of the color is discharged, the extra quantity of acid necessary for this purpose being carefully noted. Four samples were tested by this method and the following were the results:

Sample A.—Required seven minims extra of sulphurous acid

for complete discharge of the color. Thus, for every ounce of this used, one drachm extra or one-eighth would have to be added.

Sample B.—Required thirty minims extra, and, therefore, one and a half parts of this would have to be used instead of one part of an acid of full strength. This sample was more carey fully tested by volumetric analysis and was found to contain only 6.5 per cent. of $H_2 SO_3$.

Sample C.—Required no extra acid, and was prepared by me specially for this experiment.

Sample D.—This was of good strength only requiring three minims of extra acid, and was obtained from a photographic dealer, which may perhaps account for the freshness of the sample, whereas B was obtained from an ordinary drug store.

Experiments were made to determine whether sulphurous acid alone would preserve Pyrogallol without the combination of sulphite of sodium, and the results fully bore out the conclusion notified by Mr. F. C. Beach in the INTERNATIONAL ANNUAL for last year, 1888, p. 107. Therefore I do not consider it necessary to give any details.

Sulphurous acid, though a weak acid, forms numerous well defined salts. These salts, called sulphites, are of two classes—the normal, which have the formula X_2SO_3 such as sodium sulphite and the bisulphites or acid sulphites which have the formula $XHSO_3$. Such as the bisulphite of soda, $Na\,H\,SO_3$. All these salts are decomposed by strong acids, such as hydrochloric, nitric, or sulphuric acids, a sulphate, nitrate or chloride being formed and sulphurous acid set free. When sulphurous acid is passed into a solution of carbonate of soda, or preferably over damp crystals of carbonate of soda, sodium sulphite is formed.

$$\underset{\text{Carbonate of Soda}}{Na_2\,CO_3} + \underset{\text{Sulphurous Acid}}{H_2\,SO_3} = \underset{\text{Sodium Sulphite}}{Na_2\,SO_3} + \underset{\text{Water}}{H_2\,O} + \underset{\text{Carbonic Acid}}{CO_2}$$

And if excess of the acid be used, the acid sulphite $NaHSO_3$ is formed. Most of the commercial sodium sulphite is made by passing sulphurous acid to saturation into damp crystals of carbonate of soda and when no more is absorbed, then adding an equal weight of carbonate of soda the normal sulphite being thus formed :

$$\underset{\text{Bisulphite of Sodium}}{2\,Na\,H\,SO_3} + \underset{\text{Carbonate}}{Na_2\,CO_3} = \underset{\text{Sodium Sulphite}}{2\,Na_2\,SO_3} + \underset{\text{Water}}{H_2\,O} + \underset{\text{Carbonic Acid.}}{CO_2}$$

Both the acid sulphite* and normal sulphite are alkaline in reaction and the latter is the more stable salt of the two—the former more readily absorbing oxygen, and has a greater tendency to evolve sulphurous anhydride SO_2. The potassium and ammonium salts are but rarely used. The objection to the use of the latter being that on the addition of an alkaline hydrate or carbonate, ammonia is evolved.

(1.) $(NH_4.)_2\ SO_3 + 2\ Na\ HO = Na_2\ SO_3 + 2\ NH_3 + 2\ H_2\ O.$

(2.) $(NH_4)_2\ SO_3 + Na_2\ CO_3 = Na_2\ SO_3 + 2\ NH_3 + H_2\ O + CO_2.$

When ammonium chloride, bromide or iodide is added to sodium sulphite, ammonia is also set free, therefore ammonium bromide should never be used as a restrainer with a sulphite developer.

Sulphite of sodium is stated to be soluble one part in four; practically 100 parts of distilled water at 58° F. will dissolve 58 parts of the crystallized salt, but a slight drop in temperature will cause precipitation of some of the salt; we may therefore consider that 1 in 3 is a fair strength to use. When carelessly kept sodium sulphite effloresces, that is to say, it loses some of its water of crystallization, and absorbing oxygen from the air becomes sulphate. To test the amount of deterioration is as easy as with sulphurous acid, as it is practically the same process, although we may allow 5 per cent. as a fair margin for deterioration. The following easy test will enable us to judge whether the salt be fit for use or not: Weigh out eleven grains of resublimed iodine and triturate the same in a mortar with one fluid drachm of distilled water; weigh out ten grains of the sulphite to be tested and add 9½ grains to the iodine. If, on further trituration, the brown color of the iodine is discharged the salt has lost water by efflorescence; but if the color is not totally discharged till the whole of the ten grains is added, the salt is practically pure. If, however, on the addition of the extra ½ grain the color is not entirely gone, then the salt has become oxidized and the amount of oxidization may be estimated by adding more sulphite grain by grain, triturating well between each addition. Most formulæ for sulphite developers are based on Berkeley's original formulæ of four parts of sulphite to one of pyro. Many, however, are recommended in which the proportion is increased to six of sulphite to one of pyro. This,

* The acid sulphite has an acid reaction A.H.E.

however, is quite unnecessary, and I have by me now some solution of pyro which has been made over seven months, in which one part of suphite is used with one of pyro, and it is as colorless as when freshly made, works equally as well as far as anti-staining properties as those developers containing larger proportions, and I think gives better half tones than the others, for I feel convinced that the use of too much sulphite is a cause of want of half tone, tending to blocking up of distance, and last, but not least, better printing negatives are obtained by the use of developers without sulphite. Sulphite in a developer, as every one knows, gives pretty looking negatives, free from stain, with a black deposit of metal forming the image; whereas, negatives developed by plain pyro give a brown colored deposit and the best prints are obtained from the latter class of negatives.

Many formulæ are given in which saturated solution of citric acid, sulphuric or sulphurous acids are directed to be added, for the neutralization of the alkalinity of the sulphite, till blue litmus paper turns red. First, I would say that sulphurous acid alone is the correct acid to use, and that a definite quantity should be added to the sulphite previous to dissolving the pyro. Secondly, litmus paper is utterly useless for testing the acidity of the solution, as pointed out by Dr. J. H. Smith in the *British Journal Almanac*, 1888, pp. 443–6: Litmus paper will not turn red till the acid sulphite is formed. No doubt many will say that I am advocating the reduction of a valuable antistain. I am not, however; I am simply advocating the reduction of superfluous and wasted matter. If the pure recrystallized salt is used one part of the sulphite will be found ample to preserve an equal quantity of pyro.

Metabisulphite of potash has lately come into prominence as a preservative for pyro. And when first introduced I certainly thought it an improvement on the normal sulphite; but I certainly do not think so now, as on keeping sulphurous acid is evolved and sulphate and sulphuric acid are both formed. Metabisulphite of potash is the only compound of sulphurous acid and potassium used, and its manufacture was, and perhaps may be now, the subject of a patent, as it was first introduced by a firm of chemical manufacturers as a substitute for bisulphite of lime for cleaning beer casks, etc. The composition of this salt is stated to be the acid sulphite of potash deprived of

the elements of water, some say by heat; but I believe Vogel suggests that alcohol is the agent used.

$$2\,KHSO_3 - H_2O = K_2\,S_2O_5 \text{ or } K_2\,SO_3\,SO_2.$$

Its sole use is as a preservative of pyro; and when the salt is pure and the solution freshly made it is equally as efficacious as the normal sodium sulphite, and in fact more so, as much less of the metabisulphite is required; but should the solution be stale, sulphurous acid is always present, and may be instantly recognized by its pungent odor and the yellow tinge it gives to the pyro solution, and usually considerable amount of sulphates which considerably retard development.

From an analysis of three samples of this salt which I made some year or more ago, I found that the salt, whether fresh or stale, gave the same results, only in varying proportions, and its composition might be considered to be—the so-called metabisulphite $K_2S_2O_5$, acid sulphite $KHSO_3$, and considerable sulphate $K_2\,SO_4$, and $KHSO_4$.

I have thus briefly run through the whole of the chemical side of a sulphite in the developer, and I hope out of the chaff some one may find a few grains of wheat. Of the other uses for sulphites in photography but little need be said. Sodium sulphite is used as a blackening agent in mercurial intensification instead of ammonia, and with good effect. Sulphurous acid or a solution of sodium sulphite acidulated with sufficient sulphuric acid to make it smell strongly of SO_2, may be used as a clearing agent for pyro stained negatives.

If any apologies are needed for this paper being devoted so much to chemistry, I can only say that it is actually a stop-gap and substitute, and that I had hoped to be able to present to the American and English readers of the second volume of the INTERNATIONAL ANNUAL a method whereby prints rivalling albumen paper in tone and appearance could be obtained from bromide paper, but the fates have decreed that it was not to be, so many small irons have needed attention that the chief one has got cold; but all my readers know that the ordinary black tone of bromide paper can only be modified by a slight degree to a greenish dirty hue, or else a slightly brownish black or rusty tint, by wrong exposure and unsuitable development, but I have fortunately been enabled, by a simple, easy operation, which any tyro can manage, to tone the black deposit to a rich, warm sepia, a deep brown and a reddish brown, and I am only patiently

waiting for a little leisure when I believe I can obtain the brilliant purple shades which are so much admired. Thus I hope to be able to enable the professional as well as amateur to be entirely independent of any such variable gentleman as the clerk of the weather and his good printing light. And I am waiting also for some sunlight to enable me to test whether my toned bromide prints are as permanent as our old friends the silver image; and should I be successful, and the results are worth attention, I promise to give a full account next year if I am honored with an invitation to write for the third annual.

SEA AND SKY.

By W. H. Walmsley.

Cloud negatives, (made primarily for the purpose of printing with landscapes having only cloudless skies), are to be found in the cabinets of most working amateurs; but cloud effects, as pictures in themselves, are far too few and infrequent, when their claims to a place in every collection are considered. Nature presents no more beautiful pictures to the eye than those painted by the masses of vapor floating in mid air, whether they be tinted with the gorgeous colors of an Autumn sunset, or drawn in the gray monochrome of a gathering storm. At sea especially, may the finest views of this description be obtained the mingling of sea and sky affording an infinite variety. After a storm, with the waves running "mountains high," and the sun struggling to emerge from behind a swirling, watery mass of vapor, many very striking pictures may be caught that would delight the heart of an artist. And the army of amateurs constantly crossing the ocean, will find an agreeable diversion from the monotony of deck pictures, in turning their cameras upon the waves and clouds that encompass them about.

For this purpose any camera will answer, though one of the detective form will be found the most convenient, as it is indeed for all the purposes of a traveler. Glass plates *will* do, but the Eastman films are far superior for two reasons: their entire freedom from halation or solarization, and their adaptability to use in a continuous roll, thus enabling the operator to make a rapid succession of exposures; which are necessary at times when the cloud effects are changing with the velocity of the

wind itself. A rapid lens, with the focus set for distant objects, a stop of *f/16* or *f/22*, and a quick shutter will complete the necessary outfit.

The picture should include both sea and sky, care being taken to have the horizon line either above or below the centre, never exactly in the middle. Hold the camera in the hand, let the lens point toward the view sought to be captured and press the pneumatic bulb; presto, the thing is caught. What does it matter if you also catch a fall through a sudden lurch of the ship? Up and at it again. The game is worth all it costs. Some of the very finest effects are obtained by "firing" directly at the sun just as its disc emerges from behind a dense cloud. Do not fear solarization. It will never occur when using films and a quick shutter.

During the past Winter I made a voyage to Liverpool and return, and for the first time employed a camera in recording and preserving these beautiful but evanescent effects of sea and sky, instead of using it as heretofore on similar occasions in making "Deck Views." The result is a collection of pictures that are a constant source of delight. My camera was a Kodak, containing one hundred exposures, which sufficed for an entire voyage, one way, without replenishing. A constant succession of gales was experienced, interspersed with occasional bursts of sunshine, and some really wonderful effects were secured. In one negative the sun's disc is seen just bursting from behind a scurrying mass of clouds, whilst his reflection is clearly defined in the seething mass of waters in the wake of the ship. It is a picture that no artist could hope to rival. Almost every variety of cloud pictures ever seen on the North Atlantic were recorded by the unerring little lens on the outward voyage. During a whole day's steaming in St. George's Channel, belts of clouds, like huge ribbons of an intense purplish hue, stretched athwart the otherwise cloudless blue vault, and I was fortunate enough to catch one of these with the sun's disc completely hidden behind it, affording a picture of rare beauty and interest.

I have been so much interested in this branch of photography, and the results obtained have been so much admired by those who have seen them, that I have ventured to bring the subject to the notice of the numerous readers of THE INTERNATIONAL ANNUAL, in the hope that it may prove interesting and instructive to some of them at least.

THE CHEMISTRY OF HYDROQUINONE.

By Walter A. Watts, M. A.

The new developer, hydroquinone, hydrochinone, hydryquinone or quinol, as it is variously called, is coming into such extended use, and has so many admirers, that a little consideration as to its chemical constitution and relationships may not prove uninteresting.

To begin with, it is, perhaps, somewhat unfortunate that it should be known by such a variety of names, and still more, perhaps, that a spelling not warranted by its chemical derivation and etymology should appear likely to take the popular favor.

Hydroquinone was first obtained as a derivative from quinic acid, and this received its name from its association with quinine, being contained along with quinine in cinchona bark, and obtained in the manufacture of quinine as a by-product. It is true that by some of the older writers this was called kinic acid, but this mode of spelling has quite been given up, and rationally so, for, since quinine, quinic acid, quinone, hydroquinone, and quinhydrone from a series of closely related compounds, it seems only reasonable that the same form of spelling should be maintained in them all. Another reason is that the spelling kinic acid would appear to connect it with kino and catechu, which possess their own acid and series of related products. Those who adopt the spelling hydrochinone or hydrokinone, ought, to be consistent, to speak of chinine or kinine as the well known medicine and of chinone or kinone for quinine; but this mode of spelling is not likely to be adopted, at least in English-speaking countries.

The proper name of this substance is, therefor, either hydroquinone or quinol, and of these two the latter is, perhaps, preferable, firstly, because it is shorter, a point of some practical importance to the photographer who prefers to use a short word, as hypo and tyro, and secondly, because the termination "ol" is generally given in a systematic nomenclature to bodies analogous to alcohol, and thus shows its relationship to pyrogallol and thenol, as well as to such substances as catechol and resorcinol, which, as we shall see presently, are very closely indeed related to quinol.

The abbreviating tendency of the practical photographer has

already, indeed, laid sacrilegious hands on hydroquinone, and a disposition is manifested to call it hydro, which is to be deprecated, owing to the possible confusion with hydroxylanine, which *may* come into more extended use as a developer. I have even seen it recommended to call it "quinone, which is still worse, as there is already a quinone with different properties from hydroquinone. On the other hand, the term "quinol" is just as short and has the great merit of being the correct name for the substance.

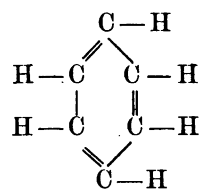
The full chemical name of quinol is paradihydroxy-benzene, which, although not likely to be adopted by the photographic fraternity (in fact, if no other name were available, it would probably get shortened to "*paradi*," which suggests the somewhat mild pun that quinol is the *paradise* of photographers who desire a developer that will give good results with either underexposed or overexposed negatives without staining plates or hands) give full information to the chemist as to the constitution of the substance and its relations to other bodies. Much jeering is indulged in by the uninitiated at the jaw breaking names of modern chemistry and certain of these names must be kept in type by the comic papers for use when the usual supply of weak jokes runs short, but they each have their meaning and each conveys a large amount of information to the chemist. To return to paradihydroxybenzene—it is *one* of the dihydroxybenzenes which means a benzene (C_6H_6) having *two* atoms of H replaced by hydroxyl, HO, thus its formula is $C_6H_4\,(HO)_2$. Pyrogallol, which is equally interesting to the photographer is a *tri* hydroxbenzene—that is *three* atoms of H are replaced by HO giving the formula $C_6H_4\,(HO)_3$ thus showing a great analogy between these two substances which, though very different in many of their properties, agree in having a strong affinity for oxygen and therefore in possessing the developing power. We have called paradihydroxybenzene *one* of the benzenes and the prefix *para* shows which one; there are two others one of which is *ortho*-dihydroxbenzene, or catechol, and the other meta-dihydroxybenzene or resorcinol. There are thus three substances, catechol, resorcinol and quinol, all having the *same* composition $C_6H_4\,(HO)_2$ and distinguished from each other by the prefixes, ortho, meta and para attached to dihydroxybenzene. Catechol is so called because first obtained by heating catechu, and it is obtained from kino (hence the inadvisability of applying the term hydroquinone

to paradihydroxybenzene), it can also be obtained from one of the benzene compounds.

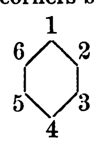
Resorcinol is similarly named from orcin, a coloring matter obtained from lichens and as it is also obtained from the resins galbanum and gum-ammoniac it was called resorcinol. Quinol, as we have seen, is obtained from quinic acid, so that the three names mentioned best describe the three substances in question unless we use the much longer but more scientific terms ortho, meta or para-dihydroxybenzene. It is remarkable that these three substances having a compostion exactly alike should differ in their properties, and be capable of being distinguished by chemical tests; they all however agree in being readily oxidizable and in being capable of reducing metals, so that it is quite possible that either catechol or resorcinol may eventually compete with quinol as a photographic developer.

It is possible to a certain extent to explain the reason of three substances of the same composition thus possessing different properties and the theory most generally accepted is as follows:

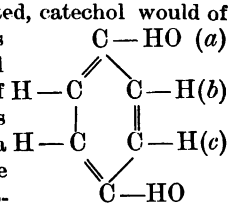
Benzene may be represented as a closed chain consisting of six carbon atoms and six hydrogen atoms, thus:



It will be noted that each carbon atom being a tetrad is joined by four bonds, alternately two and one to the neighboring carbon atoms and by the remaining one to the atom of H; now dihydroxybenzene is formed by *two* H atoms being substituted by HO and if the corners be numbered thus:



Either 1 and 2, 1 and 3 or 1 and 4 may be the substitute. If 1 and 2 are taken we have an ortho-compound; if 1 and 3 a meta-compound, and if 1 and 4 a para-compound, therefore quinol being para-dihydroxybenzene is thus represented, catechol would of course have the two HOs at the points marked (*a*) and (*b*) and resorcinol would have them at (*a*) and (*c*). This distinction of placing *orientation*, as it is called, applies not only to the alcohol-like bodies but to a whole series of compounds. Thus we have an ortho-dinitrobenzene, a meta-dinitrobenzene and a para-dinitrobenzene, similarly phthalic acid, an ortho-compound isophthalic acid, a meta and terphthalic acid,



a para-compound; and further, usually one ortho-compound yields another in the same series, while one para-compound yields another.

This distinction not only applies to the dihydroxybenzene but also to the trihydroxybenzenes of which pyrogallol is one, being the ortho-trihydroxybenzene and having its HOs in the positions 1, 2, 3; the other two are respectively phloroglucinol which can be obtained from resorcinol (a meta-compound), and hydroxyquinol, similarly obtained from quinol (the para-compound). It is quite possible the last may prove to be an active developer.

The way in which quinol is made is as follows: aniline, a substance largely manufactured as the source of so many aniline dyes, is dissolved in sulphuric acid and water and potassium bichromate added; a brown liquid is thus obtained, to which is added potassium sulphite, and it is then extracted with ether, which is distilled off, and the residue dissolved in as little hot water as possible, to which is added sulphurous acid and animal charcoal, and the solution is boiled and filtered. Quinol crystallizes out on standing in hexagonal rhombohedral prisms, which are soluble in hot water, alcohol or ether. When it is sublimed quinol crystallizes in a different form, so that it is dimorphous. Quinol is easily converted into quinone by oxidizing agents, and its solution reduces silver nitrate on warming, hence its developing powers.

In the reaction described above aniline, which is a benzene containing NH_2 in place of one of the atoms of H, is oxidized by the sulphuric acid and potassium bichromate forming quinone, $C_6H_4O_2$ or benzene with two of CO in place of the C at 1 and 4, and the sulphurous acid reduces the quinone to quinol by substituting HO in place of the two of O as represented by the equation:

$$C_6H_4O_2 + 2H_2O + SO_2 = C_6H_4(HO)_2 + H_2SO\ ,$$

hence the name hydroquinone as being quinone with two of hydroxyl in place of O_2.

When quinol is partially oxidized to quinone, or when quinol and quinone are mixed, a remarkable substance called quinhydrone or green hydroquinone is formed, which appears to be a union of the two substances:

$$C_6H_4O_2 + C_6H_4(HO)_2 = C_{12}H_{10}O_4.$$

This forms, perhaps, the best test for quinol, as the cautious addition of chlorine water gradually produces this substance, which forms a crystalline precipitate in the shape of very deep metallic green prisms, dissolving in hot water with a deep red color, but recrystallizing on cooling. This action may be used to distinguish a developing solution containing quinol from one containing pyrogallol, which has not this action upon chlorine water, but gives a dark colored precipitate with ferrous sulphate.

THE STUDY OF PHOTOGRAPHY.

C. J. Watson.

Are we sufficiently systematic in the study of our favorite art? Societies for its encouragement, mostly composed of amateurs, are springing up on all sides ; but do they form the most efficient means to the end in view? It is true that they are very pleasant, affording us meetings where we can enjoy a chat with kindred spirits and in turn have the pleasure of giving and receiving some pet wrinkle, but what should we think of an artist who expected to attain eminence in his art by the picking up of casual hints from amateur friends and by inspecting their finished work? Are we to grant that Photography is such a mechanical art that we can dispense with the training necessary for those who wield the pencil or the brush? Does not the successful carrying out of a photographic process presuppose a familiar acquaintance with chemistry, with experimental physics and with the rules of art in its mental effects? Nevertheless, how many of the practicers of the black art have attended even an elementary course of chemistry, to say nothing of one specially devoted to photographic chemicals; for, it is to be noted, that the greater part of our familiar materials are scarcely mentioned in chemical text books. A short time since, I found that one of the most eminent of professional portrait photographers in Birmingham did not know the reason why an oxalic acid bath should be used after the iron developer, and, doubtless, most of us are constantly using reagents for which we could give no scientific reason. Consider the divergence in opinions as to the method of using certain chemicals. Some operators warn you to thoroughly wash the alum out of a plate before placing it in the hypo, whilst another who, as you know, turns out good work, says that he uses them mixed in one solution. They cannot

both be right; but such things should not be matters of opinion but of settled experiment. How many persons could give a satisfactory explanation of the action of restrainers and retarders, of hypo-eliminators, or of toning formulæ? In this respect the professional does not shine much more than the amateur. As a rule, the distinction between the two classes does not consist in the receiving of money, but in the fact that the one has learned his business and the other has not. How often do we hear the expression, "Yes, it is very good for amateur work;" which shows that he is not expected to produce such good results as the man regularly used to it. Who would expect a photographer any more than a tradesman or manufacturer to succeed in business unless he had undergone a course of training in an establishment conducted by older experienced persons? But even the professional is liable by the necessities of his calling to become narrow-minded; he knows the one beaten track, but outside that he is equally at sea with the amateur. Employers do not care for their assisttants to spend their time in learning fresh methods, they like a man to know his work and stick to it. Moreover, there are few places of business where more than two or three branches of the art are carried out, and consequently the only method for an assistant to obtain an all-round knowledge of the subject is to frequently change his situation—a plan that has obvious disadvantages. Now, what is the proper remedy for this state of things? It will be at once replied that this is the very thing that our societies are intended to remedy. True; but I ask again, are they sufficiently systematic? I know by experience that one may be a member for twenty years of an energetically conducted Natural History Society and never make acquaintance with some of the commonest forms of life, which were duly introduced in an elementary course by a responsible teacher. Volvox and rare diatomaceæ were plentiful enough, but Protococcus and Vaucheria. Oh, no! we never mention them. So it is in photography. Certain subjects crop up again and again—lantern exhibitions of views of the same places—enthusiastic expositions are given of new processes destined to fade like the leaves in Autumn, but the elementary processes which are at the base of all success are regarded as too trivial to mention, and so the new recruit in photography is left to find them out for himself at the cost of valuable time and of a not inconsiderable inroad into his available

pocket money. It will now be seen what I am driving at. We want practical classes which will go regularly through the subject from the beginning up to as many of the processes as may be found practicable. The teacher should be a thoroughly experienced man and the students should be expected to perform, either under his supervision or at home, all the experiments shown in his lectures. As students would probably not care to go to the expense of all the apparatus, arrangements might be made for its hire, and in this way they would gain a practical acquaintance with forms of apparatus which would teach them which to buy with advantage. It should be indispensable that an examination be held,such as that conducted by the City and Guilds of London, which would help to induce regular work and a spirit of emulation. It is possible that in the higher or less practised branches, it might be difficult to find a man capable of giving instruction in them all, but this could be met by supplementary lectures being given by gentlemen specially versed in those branches, care being taken that the instruction was of the same thorough nature. Moreover, some students might object to going through them all; but I think that a real lover of the art will be willing to make a practical acquaintance with all its branches, even if he does not intend to put them into practice himself. It is of considerable importance to be a member of a class. It will generally be found that the home student is too liable to the temptation to wander from one subject to another, or to get too many subjects on hand at once, instead of concentrating his energies on one until it is mastered. It is no use trying to split a boulder with blows of a tack hammer, however continuously repeated, and it is, in fact, better, in the domestic language, "to go mad at a thing," while you are at it, and when successful to go on to the next. The details of the proposed classes must, of course, be settled to suit each individual locallity; and I think it would be best if our societies were to press it upon the attention of already existing educational institutes. I know, of course, that there are classes at the London Polytechnic and a few other places, but I have had no experience of them, and nothing worthy of the name has been established in this city (Birmingham). However, as this Annual will appear in the Summer, it will give opportunity to my readers to talk the matter over, and I hope that next Winter will see many such classes established, either in connection with our institutes or our societies.

WEATHER WISDOM FOR LANDSCAPE WORKERS.

By G. M. Whipple, B. Sc., F. R. A. S., Superintendent of the Kew Observatory.

No introductory remarks will be needed for this paper, for there can be no question as to the utility to the landscape photographer of a knowledge of weather signs and cloud indications in saving him from possible fruitless journeys, as well as from wet jackets with the accompanying waste of precious time and costly material. These sources of annoyances are occasionally augmented by needless coach hire, railway fares and other expenses incidental to traveling.

In the first case it is as well to clear the ground by premising that we must discard entirely all the almanac weather prophets and believers in the connection between atmospheric changes and lunar phases. The latter class of traditions is exceedingly numerous and very hard to contend with, because the skilled meteorologist cannot give an absolute denial to the existence of such a connection, although he knows that its effects upon the weather are almost infinitesimal in comparison with the other changes produced by local and terrestrial causes, and can only be detected by discussing long series of carefully made observations.

To begin then, it is advisable to divide persons who are desirous of learning the kind of weather to be expected, into two classes: 1st. Town dwellers, and 2d, those residing in country districts, or those who have immediate access to good daily papers, and reside in the vicinity of telegraph offices, and secondly those who live in isolated spots, more or less remote from these great advantages of civilization available to the urban resident.

We will commence by considering the first class of enquirers.

Almost every country, nowadays, possesses a meteorological department, supported by the government, which is in telegraphic communication with specially trained observers scattered over the whole country, at the same time the central office of the department in each country is connected also by wire with all the others, so that their directors have constantly before their eyes the state of the weather at all times in every part of the civilized globe.

With this enormous mass of information at their command they are able to watch the progress of storms and weather changes from place to place, their growth and fading away, as well as the courses they pursue in their transit, all of which phenomena

are carefully plotted down on charts which are first diligently studied and then preserved for future reference.

With these materials then at their disposal, they are enabled to predict the probable weather with an incomparably greater probability of success than any individual observer who has nothing but his own instruments and observations to guide him in forecasting, can well hope to reach.

The conclusion is hence easily arrived at, that the urban resident should rely on the official forecasts which are published daily in most of the newspapers, or, failing this, should a knowledge of how the day will turn out be worth the cash to him, let him apply to the nearest telegraph office for a special forecast from the central meteorological office of his country.

In the British Isles this office is situated in London, and the necessary information may be obtained from the postmaster at any postal telegraph office in Great Britain and Ireland, "on payment of a fee of 1s. in addition to the cost of a telegram and reply."

The annual reports submitted to Parliament show that the official forecasts are right, speaking roughly, in nine cases out of ten, or more closely 84 per cent. of them are justified by the subsequent weather. Many countries attain even higher values of success than this, but England's Atlantic seaboard prevents information being obtained as to what is taking place to the west, for it is found that few if any of our storms travel all the way over from America.

The enquirer who desires to make the fullest use of the information should be possessed of a barometer or an aneroid, and by watching the changes indicated by these instruments, and superposing the deductions he arrives at by their aid, upon the official forecasts, may bring them as it were up to date and so form fresh ones with a very great certainty of arriving at the truth.

The rural observer who must trust to this barometer or aneroid, and to his eyes alone, should carry in his mind certain of the following rules: In the first place there is the old one attributed to Fitzroy, which is so often found engraved on the scale plates of barometers and is generally applicable to Western Europe. It refers to the phenomena indicated by barometric movements and runs thus:

RISE for Northerly, *i. e.*, N.W., N.E., dry or less wind except wet from north.

FALL for Southerly, S.E., S.W., wet or more wind except wet from north.

This is to be interpreted as follows: The average height of the barometer at sea level in this country being just a shade below thirty inches, if the glass is seen to be rising steadily above this point, whilst the weather gets colder and the air drier, northwesterly, northerly or northeasterly wind, a less wind, less rain or snow may be expected.

If, however, the barometer is falling and the weather is getting warmer, damper and feels muggy, wind and rain may be looked for from the southeast, south or southwest. The following exceptions should be noted: If the weather gets warmer whilst the barometer is high and the wind northeasterly, a shift of wind to the southward is to be expected, but when it becomes colder whilst the wind is southwesterly and the barometer low, we may look for a sudden squall or perhaps a storm from the northwest, with a fall of snow if the season be Winter.

A very useful adage to bear in mind is the following: "When the wind shifts against the sun, trust it not for back it will run.' That is to say when changes in the direction of the wind take place in the order W., S.W., S.. S.E., weather will probably be unsettled.

If the barometer keeps steadily high (above 30.5 in.), for several days, wind will be light and most likely dry, but if it stands steadily low (below 29 inches), wind will be light and weather cloudy and wet, broken by fine weather occasionally, "pet days," but storms are imminent.

When it rises slowly from a low level, expect drier weather, lighter winds or calms and local fogs; falling gradually from high level weather becomes wetter and more unpleasant, and there will never be a certainty of having a fine day. A steady barometer foretells steady weather, but sudden rises are almost as bad signs as sudden falls, in the height of the mercurial column.

As regards weather knowledge to be obtained by consulting the aspect of the sky, so useful to country residents, we may classify the following signs as indications of probably fine weather: A rosy sky at sunset, whether clear or cloudy, a grey sky in the morning and a low dawn showing a light, bright blue sky later on, soft delicate light clouds in quiet tints or colors, and copious dew. Approaching wet weather is predicted by a

dark red sky, a pale yellow sunset, hard, definitely outlined clouds, small inky looking or driving scud, misty clouds on heights or hill tops increasing or descending. Halos, "Noah's Arks" and unusual clearness of sky are all good signs of rain.

Windy weather is foretold by tawny or coppery sunset clouds, by hard edged, oily looking clouds and by a dark gloomy blue sky.

After fine clear weather, the first signs in a sky of a coming change are usually light streaks, curls, wisps, or mottled patches of white distant clouds, which increase and are followed by an overcasting of murky vapor that grows into cloudiness. This appearance, more or less oily or watery, as wind or rain will prevail, is an infallible sign.

There is a handy little instrument called the rainband spectroscope which enables some observers to gauge the condition of the aqueous vapour in the air readily as indicated by the presence or absence of certain absorption bands in the solar spectrum. In the hands of some persons it is said to be an almost infallible means of judging the approach of rain and its probable intensity.

As, however, the instrument does not attain the popularity which was expected of it, the conclusion has been arrived at, that, for its successful employment, a more finely developed color sense and a keener appreciation of delicate graduations of shades of tint is requisite, than falls to the lot of the eyesight of most persons.

As photography has, in astronomy and other studies, stepped in and carried investigation farther when the limits of vision have been passed, so we would hope that it will now come to the assistance of rainband spectroscope, and work this hitherto untrodden field of meteorological research up to a higher stage of development.

REMINISCENCES.

By E. T. Whitney.

Your invitation to contribute some article to your ANNUAL for 1889 duly received. It affords me pleasure to comply with your request, perhaps more than it will the reader of any article I may send. I may be termed an old fogy, as I shall send nothing

new to those unacquainted with the early history and trials in making daguerreotypes, the article may be of interest. After the announcement of Daguerre's discovery among the first to experiment was Edward Anthony, to him, as to his brother Henry in later years, we went for advice. The two brothers little thought in their close quarters, corner of Fulton street and Broadway, forty-five years ago, selling morocco cases, they were laying the foundation of one of the largest stock houses in the country. In common with all engaged in the picture business and the public generally, we mourn their loss.

At this time, 1844, Abraham Bogardus, M. M. Lawrence, J. Gurney, Root, A. W. Paradise (with Brady) and myself (and one or two others whose names I have forgotten) were the only ones in New York making daguerreotypes. Let the reader now remark the contrast between the past and the present. No journals, no bulletins, to give you aid, every dark room barred of access. A *New Discovery!* that promised great things, and no information except what could be gleaned from foreign journals. Not only were the dark rooms closed but those who had opened galleries for sittings had to keep the outer doors locked each morning until they could try the coating boxes before admitting sitters. The great difficulty to be overcome was to prevent fogging the plate with the fumes of bromine.; daguerreotypes could be made with iodine alone, but it was too slow; think of sitting ten or fifteen minutes for your picture! This uncertain state of things lasted until it was discovered that bromine could be held in lime and give off the fumes slowly, thus enabling us to coat the plate without fogging. The next difficulty arose from dampness of the buffs, this was soon remedied by heat.

In 1846 I left New York and moved to Rochester, opened a gallery in the Arcade. In 1848 made the first exhibition of pictures taken by the sun at the State Fair held in Syracuse. At this place, with the assistance of Geo. N. Barnard and D. D. T. Davie, organized the first convention for promoting the advancement of the art, and arranging a scale of prices for daguerreotypes. In 1850 Brady and Root prepared some large daguerreotypes for the World's Fair in London. I also prepared a frame, that arrived in New York too late to go with the others. This frame was taken by C. Wager Hull to the American Institute Fair in 1882; after that Scovill's people sent it to the Photo Convention at St. Louis, and now it hangs in Scovill's on Broome

street, and is considered quite a curiosity, and is probably the only frame of large deguerreotpyes in existence.

In 1850 J. W. Black, of Boston, came out to Rochester and instructed me in the phótographic art, and here began a new set of trouble. No collodion in the market, no trays for development, no albumen paper. We had to make our gun-cotton, our trays and bottles, out of sheet gutta percha. After photos were printed to give them a finish used wax. I have waxed photos now thirty-nine years old not faded. But not to make this paper too long I will close by giving a short account of the two first solar prints that were made in New York in 1853 or 1854 by Brady and Gurney. They had galleries side by side in Broadway, near White street. Each unbeknown to the other was making life size solars for the American Institute Fair, held in those years at Castle Garden. I had access to both, and kept the secret. In order to sensitize the paper for a full length picture, Brady prepared a gutta-percha tray 7 feet long by 5 wide, which with the silver bath cost him over $100. On this silver wave the paper was floated until sensitized. The negative used was on a small plate, a group of three, Brady, Gardener, Wenderoth, and was six feet high, the picture was in his Washington Gallery in 1862. J. Gurney prepared his paper at less cost by putting the silver on with a cotton wad; his subject was a full length of a lady, and both pictures were very good.

"SHOOTING" IN THE STREETS.

By H. H. Williams.

Among the many "detective" and other instantaneous pictures one sees at the various exhibitions, it is a little singular how very few there are of "street life"—sea side, yachts, divers, horses, cattle, children, leap frog, etc., etc.,—but very few indeed of work and every day life as seen in the streets of our large towns.

Good subjects present themselves ready made even better than when sought for. As we start out the newspaper boy with *Evening Echo* or the match girl are well worth a passing shot; farther on we find a fruit stall, with the usual urchins with empty pockets gazing longingly at the coveted treat, with the expression peculiar to impecuniosity on their countenances.

Then a cabman picking up his "fare" attracts our attention and is quickly transferred to our roll.

In a seaport town like this (Liverpool) the docks will furnish abundance of material, ships loading and discharging, sailors of all colors, horses, carts, wagons, all go to form our picture. Good groups can often be had of people waiting for the bridges to close.

A trip to the landing stages is well worth taking; here we have people hurrying to the ferryboats or waiting for friends, farther along we come to passengers going on board the tenders for the ocean steamers, porters are seen with huge boxes and trunks going down the gangway, friends saying "good-by," waving handkerchiefs, etc., any of these, *if taken at the right moment*, will make pictures worth keeping.

The above are only a very few of what can be got in the streets, and I feel sure this branch of our art is well worth more attention than it at present receives.

This kind of work needs a good "hidden camera" with a roll holder, and I have yet to see one that anything like answers all the requirements. Most of those on the markets are too full of "things not wanted." The simpler the instrument is, the better. Some are covered with nice, shiny leather, plenty of bright brass things sticking out all over. Well, if you want people to know what you are doing, and get your camera broken by catching against things, all this is "real good." The plainer the outside is the better; there should be no projection, and openings required should close with sliding covers flush with the surface. What shutter is the best? is a hard question. It should work without noise, be simple, and, if possible, go off several times with one setting. The finder on which so much depends *must coincide with the subject shown on the focusing screen*, and should not have a large external opening, or it will look like a great big eye in front of the box.

PHOTOGRAPHY AS A DECEIVER.

By Walter E. Woodbury.

In the last number of your annual, I was very much surprised to find that nobody had written under the worn out heading, "Can Photography Lie?" So that you shall not of necessity be

without it this time, I am writing this. I have changed the title however, to "Photography as a Deceiver," which I hope is an improvement. That it is, there can be no question about and not in one but in every case a photograph is but a deceptive representation of the object photographed. False perspective and false representation of colors are perhaps the most serious charges that can be brought against the photograph.

With regard to false perspective, the lens is the culprit in this case. What lying representations can and are made with wide-angle lenses, for instance.

I once saw a photograph taken with a wide-angle lens of a Public Garden. In the photograph one saw an immense garden filled with trees, a bandstand and public fountain right away in the distance. Overjoyed at thinking such a beautiful place of public resort was within easy distance, I determined to ride over there, but judge of my dismay when I saw trees, bandstand and public fountain, one jumbling mass, standing on considerably less than an acre of ground.

The majority of lenses are given to magnifying objects placed near to the camera, while diminishing those at a distance from it, producing very untruthful or deceptive pictures.

A carriage drive leading towards our house appears in the photograph to be at least 100 yards in length, while in reality it is but 25 at most.

In portraiture this defect is very often visible to the disgust of the sitter who naturally dislikes to accept as "likenesses," pictures in which his hands and feet appear to be about the size of the Scotchman's, whose feet were so large that he was obliged to wear kilts, being wholly unable to put them through his trowsers.

"It isn't a bit like me," is the common verdict, when the "likenesses" are brought home. A friend of mine who expressed this opinion upon some really capital portraits of himself, was considerably astonished when I said: "How can you say they are not like you when you never saw yourself?" "Never saw myself," he replied; "don't I see myself every morning or at any other time in a looking-glass?" "No," I returned, "most decidedly not. Look here," taking a book from off the table and holding it in front of the mirror. "You can read this book, can't you—well, can you read its reflection in the looking-glass?" "No," he answered; "of course, not." Well," I continued, "you cannot read it because it is a reversed representation; just

the same with yourself, the image you see in the mirror is also reversed, and therefore, except by the aid of two mirrors it is quite impossible to see yourself as others see you. That likeness you have shown me is, I consider, a very good one and does credit to the photographer. It is like you, but it is not like your reversed reflection which is the only thing you have seen. You part your hair on the left, you see it on the right; your nose twists to the right, you see it twisted to the left; you have a scar on your right cheek, you see it to the left; you have a squint in your left eye, you——" "Oh! that'll do," shrieked my poor friend, and fled.

With regard to color, here again photograph must be called a deceiver. Not only is it a well known fact that color is not reproduced, but their relative values as seen by the eye are not even truthfully represented. True, many important discoveries have been recently made in artocromatic or isochromatic photography by which this defect is to some extent remedied, but not wholly, and the process can only be used at the expense of lengthened exposure.

There is also no end to the deceptive photographs that can be made by combination negatives, double or treble exposure, etc. The best I ever saw was issued as a supplement some few years ago to a German photographic periodical. It represented a gentleman seated, playing chess with himself and standing up, looking on at the game. There were the three figures in the picture in different positions, but all identically the same person.

A few there are, perhaps, that will remember a lantern slide made by my father, the late W. B. Woodbury, some years ago, of a Nile boat floating under the Niagara Falls, an impossibility.

How easy it would be to make a photograph of a cockney who had never been out of his own country, seated admiring the beauties of the Falls of Minnehaha.

In making a panoramic view some time ago with a camera in which the exposure was made by means of a thin slit running along the plate, I photographed a friend of mine no less than seven times in various positions in different parts of the picture.

Spirit photography is another form of deception by various simple means, extracting money from the pockets of the foolish and simple.

Can we remedy these defects, you will ask? I am afraid not. When we succeed in obtaining photographic representations of objects in their natural colors, and when we can make lenses that will not distort or deceive, we shall, to a certain extent, have remedied the present faults of photography as a deceiver.

ARE INSTANTANEOUS PHOTOGRAPHS TRUE?

By Captain W. de W. Abney, C. B.; F. R. S.

This is a heading to an article at which many a photographer will, I suspect, hold up his hands and ask how it is that I can propound such a question. "Of course, they are truthful and correct," he will say. Well, I will admit this, and say that all the same, they may be truthful and incorrect. This reminds me of an answer given in a court of justice by an eminent expert witness, when asked whether such and such was the case, replied "Yes," and at the same time "No." The belief was that he gave such a reply to gain time for a little further reflection. In my case the reflection time is over. The photographer when taking an instantaneous view of, say a street, gives an exposure which is as short as the rapidity of the plate will admit, and in the resulting picture we see men, horses and perhaps cattle, in every variety of position of limb. The men will be seen in some instances with one leg raised high, looking as if doing anything but walking, and in a posture which is apt to create a smile. The trotting horses, too, will often be seen with heels, which to the observer will be thought to be in impossible positions; while the carriage wheels will be seen with every spoke sharp, and the tires as round as they appear at rest. Now, I would ask is such a pictorial representation of the scene truthful and correct? It is and it is not. It is perfectly truthful, so far as the absolute position of these horses and carriages are concerned, at the exact moment when the view was taken; but it is in part incorrect and untruthful, as a record of what would strike the eye at the same time. The eye may be as sensitive as the plate, in fact, we know it is so, and if the scene had been illuminated by a flash of lightning, we should see exactly what was portrayed upon the sensitive plate. But luckily we are not always seeing streets by flashes of lightning, and we are accustomed to have these impressed upon

the retina by ordinary day or sunlight. The impression made under these latter circumstances is not that of an instant, but is a combination of impressions succeeding one another during an appreciable time. Under these circumstances the general and lasting impression is that in which the movements of the limbs of men and animals are as near rest as possible, or in other words, where the movements are slowest.

Taking, for instance, Mr. Muybridge's photographs of animal locomotion, there are positions when the legs of men and horses are nearly at rest, and it is these positions which are most strongly impressed upon the retina, and give the final mental picture. It may well be, and is, we believe, just this which has caused artists to delineate the canter, the trot and the walk, in the scientifically untruthful manner in which they are often seen in pictures. It is only known that they are scientifically untruthful by a comparison with such photographs as those of Mr. Muybridge.

John Leech was a great adept at giving us the idea of motion in a cab. He drew what he saw. Instead of the sharp spokes of the wheel, is seen a fuzzy mass of wool-like matter radiating from the center, and surmounted by a tire by no means defined. Put the instantaneous photograph of the cab alongside of the drawing by John Leech, and say which is the more truthful as conveying the idea of motion. Ninety-nine people out of a hundred would give the latter the palm, I am convinced. Again, in an instantaneous photograph of a sunlighted sea, each small crest of a wave is topped by a point of light. This congeries of points of light, I may say, the eye never saw. The duration of the series of impressions on the eye are sufficiently prolonged to allow each wavelet to move a certain distance before the final mental picture is drawn, and such points of light become a line of light. So that the photograph seems to be wanting in truth. A very common optical experiment is to cause black and white sectors to move rapidly and to become a graduated tint. An instantaneous photograph, taken, say by a flash of lightning, or by a spark from a Holtz or other influence machine, would depict the sectors sharp and defined; whilst a photograph exposed to a light, comparable in duration to that which is necessary to give the eye impression, would show it as graduated. Which photograph would give the truest notion of the rotating

sectors is a question which scarcely need be asked. From what I have already said, it will be seen what are the views I hold respecting instantaneous pictures. They are scientifically correct and truthful, but as far as the eye is concerned, they are very often incorrect and untruthful. It is, therefore, rare that an instantaneous photograph can be artistically correct; and photographers must not claim for such an application of their art more than scientific value.

RAPID LONG FOCUS LANDSCAPE LENSES.

By "Albion."

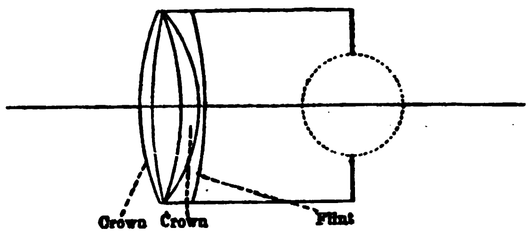
The illustrations in the front pages of the ANNUAL show the object carried out in the construction of these new lenses. It is to bring into prominence some particular object in a view that is being photographed. In 1867 the late J. H. Dallmeyer introduced a very valuable instrument in his triple meniscus wide angle landscape lens. It is so well known and appreciated that it is unnecessary to repeat here what it will do. One of the pictures in the illustrations referred to above shows in a reduced form the work of this lens. It embraces an angle of view that is large and is most valuable for panoramic effects. A few years ago, by special desire, the late Mr. Dallmeyer introduced a rapid long focus landscape lens, and the other picture of the illustration gives an example of the work done with it. Both views were taken from the same standpoint. The same effect as regards size could be obtained, of course, by using a long focus lens against a short one, at least to a certain extent. But a lens specially constructed for the purpose like the rapid long focus enables the photographer to work very rapidly; and the marginal corrections for the plate for which these lenses are constructed are very perfectly carried out.

The wide angle lens works at an intensity $\frac{f}{15}$ and the rapid long focus at an intensity $\frac{f}{11}$ hence the latter is twice as rapid.

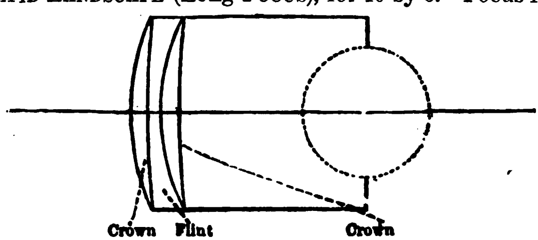
A still further advance has been made in single combination lenses within the last year in the production of a rectilinear landscape lens, which embraces an angle between the two lenses

referred to above, and works at an intermediate speed $\left(\frac{f}{13}\right)$. But it has the great advantage of being a non-distorting lens. The brilliancy of the image is not to be distinguished from that of the cemented triple combinations, and it is rapidly becoming a

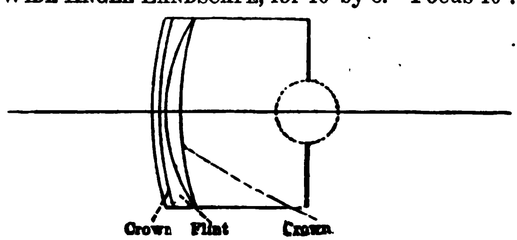
NEW RECTILINEAR LANDSCAPE, for 10 by 8. Focus 13½.



RAPID LANDSCAPE (LONG FOCUS), for 10 by 8. Focus 15″.



WIDE ANGLE LANDSCAPE, for 10 by 8. Focus 10″.



favorite. If worked at an intensity of, say, $\frac{f}{14}$ it compares favorably with, and by many is preferred, to the double combination

rapid rectilinear. There are excellent examples of the work done by this lens in the hands of the publishers of the ANNUAL, and it is remarkable that one of the greatest English artists in photography, Dr. P. H. Emerson in "Naturalistic Photography," goes as far as to say that this is the only lens that should ever be used. On page 135 of the volume referred to are found these words:

"This Summer (1888) we used one of these lenses and were delighted with it. * * * It is the best, because being what is called a long focus lens, it cannot be so ignorantly employed as can lenses of shorter focus; there is no appreciable marginal distortion, and with open aperture the outlines of the image are softly rendered, and in addition the values seem to us to be more truly rendered by it."

The accompanying diagrams show the construction of these three additions to the optical apparatus of modern photography. In each case the kind of glass in the lenses is specified, and the dotted circles give the comparative diameter of the diaphragms, the drawings being made to scale.

Although constructed specially as a view lense, the rectilinear landscape is excellent for copying work where straight lines are essential, and can thus replace the doublet lenses, in cases where the negatives are needed for photo-mechanical printing.

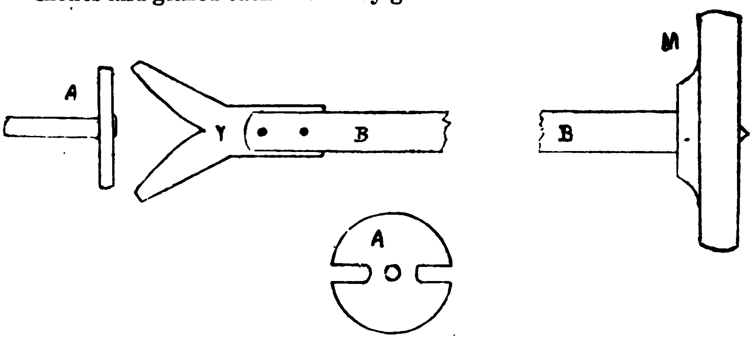
MY DARK-ROOM LANTERN.

By L. L. Anderström.

When the ordinary amateur fits up his dark room, one of the most important things to be attended to is the source of illumination. Very often too little attention is paid to this very essential matter. After struggling along several years with various small lanterns and with several arrangements for using daylight, I came to the conclusion reached by very many, that daylight is too variable and that any form of lantern which is very small has so many defects as to make it a continual source of annoyance.

Accordingly I decided to make a lantern of my own. After nearly four years' use, during which time I have had occasion to compare it with the best and highest priced lanterns in the market, I find it the most satisfactory lantern I have yet seen.

In constructing it I first built a box of white wood ⅜ of an inch thick, fifteen inches high, ten inches square at the top and eight by ten inches at the bottom. This box was open on the front and the back was vertical. A moment's thought will show you that the front inclines forward. The bottom of the box was double, with numerous small holes bored through in such positions as not to emit any white light. Through the top I bored a hole two inches in diameter and affixed an elbow which I had made by a tinsmith. On each side I cut an opening about 4x6 inches and glazed each with ruby glass.



CONTRIVANCE FOR ADJUSTING LAMP.

M, milled head : B, brass rod : A, A′, adjusting screw on burner of Lamp ; A′ shows notches made with file, into which Y engages.

Around the inside of the open front was carefully fitted a strip of wood ⅜ thick and 1 inch wide and set back about ½ inch from the extreme front edge. Into the jamb thus formed I fitted a rabbetted frame which holds an 8x10 light of ruby glass. This frame is hinged at the bottom and has catches at each of the upper corners, and thus forms the door to the lantern.

The source of light was a small kerosene lamp and was fitted with a burner carrying a wick ¾ inch wide. Lamp, chimney, burner, wick and all cost 25 cents in a country town. The most important feature of the lantern is the means of varying the intensity of the light. First with a thin, flat file I made two deep notches on the milled head of the burner by which the wick is adjusted. I then procured a piece of brass rod ¼ inch in diameter and about 6 inches long, a small piece of sheet brass and a large milled head such as is found on many cameras. The

piece of sheet brass I cut into the form of a Y and fitted it so that it would engage in the notches in the burner. This Y was then firmly fastened to the brass rod and the brass rod passed through a clean bored hole in the side of the lantern at such a height as to easily connect with the burner.

The milled head was then affixed outside the lantern to the end of the brass rod.

A little careful thought will show that this makes a loose connection with the burner so that it can be turned up or down at will.

The lamp is placed directly under the opening in the top and the adjusting rod is pushed into position. The lamp may be lighted either in the lantern or outside of it, and when it is desirable to extinguish it without opening the lantern a turn of the milled head and a slight puff into the elbow does the work.

In regard to the use of ruby glass I will say that with this lantern I have never had any trouble. My dark room is ten feet square, and I can find anything in the room easily when the light is turned up. When beginning to develop quick plates I turn the light low and as development proceeds, turn it up gradually. The lantern never gets hot and the lamp never smokes.

LANTERN SLIDE MAKING FROM LARGE NEGATIVES.

By Talbot Archer.

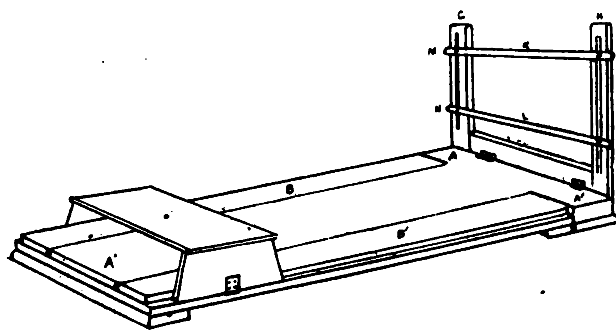
For some years I carried a 5x4 camera, and then the task of lantern slide making was comparatively easy, since it could be done by contact printing.

Placing the negative in a printing frame, the lantern plate was laid upon it, film to film, and by holding the two glasses up between the eye and the ruby lamp, it was easy to adjust the lantern plate until it covered the desired part of the subject. The back of the printing frame was then fastened in position, and the negative exposed for a varying period (average twenty seconds) at a distance of two feet from an ordinary batswing gas burner. Development with ferrous oxalate followed. I was never quite satisfied with this method, however, for the "composition" of my 5x4 pictures was usually more or less spoiled

when the central part only of each was reproduced as a lantern slide.

When I began to use a white plate camera for regular work, I found it, of course, practically impossible to make slides from plates 8½ inches by 6½ inches by this method of "contact printing."

Casting about for the easiest method of reducing pictures of this size to fit into the three-inch circle of an ordinary lantern slide, I drew a plan of the filming instrument, which was admirably made for me by Mr. J. Place, of Bull street, Birmingham. I don't think that there is a single point about this instrument that is new or original; but I have found it cheap and effective.



The base of the instrument is shown in the figure. It is made of elm, half-inch stuff, planed and blacked. The dimensions are shown on the figure, and the part B B′ (connected by a strip of wood as shown by the dotted line) are grooved into A, A,′ A,″ so that B B′ can be pulled out until the entire base is nearly six feet in length.

To the end A A′ is hinged the end piece shown in fig.
It is simply wooden frame work, having grooves in the two uprights G H. In these grooves slide, the two iron bars K L, which are fixed at any desired height and at any required distance apart, by the screws M ′ M′ and N N′ The negative to be copied is placed between the bars K L (whose edges are grooved to receive it), and its height must be adjusted until its center is in a straight line with the center of ground glass of the camera which is being used. The end piece, as a whole, is

held upright when required for use by a couple of brass catches ("hooks and eyes") at the back.

One thing remains, and this is a "slider" upon which to place the camera. This "slider" is shown in fig. ; its top is 12 inches by 10 inches and the sides are 4¼ inches high. A hole is cut in the center of the top, and the camera is fastened to the top by passing the camera-screw through the hole in the usual way.

By means of the sliding bar, it is evident that this instrument can be adapted to reduce from negatives of almost any size; and by adjusting them to the required position, any portion, or the whole, of the negative can be copied.

For use in lantern slide making, I had my old 5x4 camera fitted with carriers to take the regulation 3¼ inch square lantern plate. As I work in a room with a large skylight, I place the instrument on a table and raise one end by means of resting it upon a box; I then place a large sheet of white cardboard behind the negative to act as a reflector. The exposure in this room varies from five to ten minutes, according to the light. Those who have a window facing the north can get pictures in half a minute, by pointing the instrument out of the window, the upper sash being lowered. Or it may be carried out of doors (complete it only weighs a few pounds) and supported on a table or chair while the exposure is being made. When used in a room, I have not found it necessary to cover over the space between the negative and the lens of the camera. It is advantageous, however (and necessary when working in the open air), to screen the interval by placing over it a sheet of stout brown paper, or by throwing the focusing cloth over a couple of laths placed to support it. Finally, for development I have replaced ferrous oxalate by hydroquinone, which combines the cleanliness of oxalate with the latitute of pyro. This apparatus also answers extremely well for *copying*, the picture to be copied being pinned on a piece of soft wood or stout cardboard, which is then inserted in the place of the negative. It can also be used for *enlarging*, the lantern taking the place of the camera.

Perfect sharpness can be obtained by using a piece of ground glass to focus on, the image being viewed from *behind* with the help of a magnifying glass. The bromide paper is wetted and then laid down on the ground glass.

PHOTOGRAPHING A FLYING CANNON BALL.

By Ottomer Anschütz, Lissa, Posen.

This was considered by me as technically the most difficult problem of instantaneous photography, after I had succeeded in fixing the quickest motions of living beings, single as well as in a series of 24 phases. Several years ago a certain military authority had encouraged me to try this experiment, although he doubted the possibility of taking such a view, as, according to Professor Dr. Eder, exposures of 0.005 seconds at most could only be obtained which at a velocity of the projectile of 400 metres in a second would admit a displacing of 2 metres.

Although calculating in my attempt to obtain several phases, the main point was to furnish a proof of the possibility to reduce the exposure to 0.0001 (the ten thousandth part) of a second, and that with high sensitiveness of the plates, such a short impression of light is sufficient to produce a picture.

The view was to be taken at Meppen, on the shooting stand of the Krupp firm, which was known to me and where all the necessary material was at my disposal.

My arrangements were in accordance with existing conditions, but at the last moment unforeseen circumstances prevented a proceeding at the appointed time and compelled me to look for another field of operations, provided I was not willing to postpone the whole thing for another year. The new place was on the shooting grounds of the Gruson works. To that place I journeyed in the beginning of September, 1888, in company with my friend, Dr. Arthur Koing, the assistant of Professor von Helmholtz, who volunteered to make the necessary calculations. Hardly arrived at the place, we met with an unexpected obstacle. The shooting place had only a length of 60 m., while we required at least 113 m., as will be seen by the following: In the sharp reproduction of the projectile I observed no difficulty, but the greatest difficulty was to bring it in the visual field of the apparatus. To obtain this with certainty, I had to effect the disengagement of my instruments by the ball itself. The time required by the instantaneous shutter, from the moment of its disengagement to the exposure of the plate, I had calculated exactly by means of spark-chronographs; all that was necessary, therefore, was only to let the disengagement by the projectile take place so many metres in front of the stationary place of

the instruments, as the same will pass during this time at a rapidity of 400 m. per second, which amounted to 113 m., in the required time of 0.28 seconds. At this place a frame covered with copper wire was to be put up through which the ball had to take its course, tearing the wire, effecting hereby an interruption of the electric current and thus setting my apparatus in activity.

Having only several days at my disposal, I desisted from the arrangements of further substituting apparatus and built all my hopes upon the uncertainty of the electric ignitions, several of which were applied, but all of which acted very irregular.

Thus the last day which was at my disposal had arrived, and with it the sun shone forth from behind the clouds. Early on the 13th of September the apparatus was mounted after overcoming some local difficulties, the electric batteries, of which we had three for application, were inserted and the shooting commenced. Excitedly my friend and I read the marks upon the blackened drum of the chronograph, but the same would not show the required number. No agreement could be obtained. The ball, during the exposure, was either in front of the visual field of the apparatus or had already passed it. The developed plates showed always only the plain background. On a bar, placed in line with the course of the ball, one could easily recognize where the cannon ball had been during the taking of the view.

At last an accident favored me. It was already three o'clock in the afternoon, the sun was pretty low down and spread the long shadows of some scaffolding near by upon the white background, the prevailing strong wind had also played sad havoc with the temporary background when at last the ball was visible upon a plate in the shadow of a beam. Unfortunately the ball had arrived already at the end of the visual field of the apparatus and the later following views (I expected to have a series of four phases) did not show the cannon ball any more, which would have been the case if the projectile had been at the commencement of the visual field. Still I was satisfied, having succeeded in furnishing proof of the possibility of the views aimed at.

The time of exposure of a plate Dr. Koing has calculated at 0.000076 (seventy-six parts of a million), while during that time the projectile made 3 cm. of its course. To give also the evident proof, I had hung below the measure, projectiles of the same length, from which the displacement is to be measured. The

following day I was already engaged in the maneuvers at Münchsberg and had the opportunity to present the Emperor with the first proofs of my projectile pictures.

After reading the foregoing, every professional photographer will undoubtedly inquire about the construction of my instantaneous shutter, which I consider as justified.

To this I can reply only as follows : The apparatus which I use I have constructed myself, and they differ widely from any system known by me.

For my instantaneous shutter a patent has been applied. It will be introduced into the market before long, and this circumstance hinders me from giving here a more detailed description of its construction. But it can be seen and examined before long by everybody. The results of my apparatus are proven by my pictures.

HINTS FOR BEGINNERS.

By Guglielmo d'Arcais, Brown University, Providence.

I have noticed that for under exposures, it is very profitable to use the developer just as warm as the film will bear it.

In order to get the greatest amount of detail in the shadows (say, the hair of a half-size head) I know of no better means than to stop the development as soon as *almost* all the desired detail has appeared in the lights, then soak and move the plate in clear water for a few minutes, and finally resume the development with the chemicals. It is plain that such use of water is founded on the principle of *weak development for short exposures.*

A 5x8 detective camera with 6½x8½ Dallmeyer lens, made for me is very reliable. It is easy to handle, the impossibility of any light penetrating the camera except through the lens, the size and kind of pictures it enables one to take, either horizontally or vertically, are a few of the many advantages of this variety of camera. I do not hesitate to advise all amateur and all travelling photographers to get this kind of an apparatus, and promise them the most satisfactory results in a Summer's working trip.

It is very desirable that somebody should find out a means of obtaining perfect focus, a result (so far as I know) hitherto unattained. But that such has not been obtained as yet, need

not be a serious objection to the use of the above variety of camera; for we can hardly believe, for a man of average intelligence, it would take more than a few days to become familiar with guessing or estimating distances, so as to avoid making any serious mistake, when using such deep focus lenses as those of Dallmeyer.

QUICK DEVELOPMENT OF BROMIDE OF SILVER PLATES WITH HYDROQUINONE.

By Paul Baltin, Potsdam, Germany.

"*Gut Ding will Weile haben*" is a German proverb; the American says "Time is money." Both are right, and the one who knows how to apply practically and at any time either of these proverbs, according to circumstances, will always have the satisfaction of success for his efforts.

I may be permitted here to apply these words to a definite case of the photographic art: the development of negatives.

The idea predominates generally that time (not too scantily allowed) is required for the development of a good negative, both with the pyro and oxalate developer. That this slow development (from at least five to ten minutes) is inconvenient, will be admitted by everybody; the busy professional photographer as well as the impatient amateur whose curiosity will frequently not permit devoting the necessary time for the development.

If the hydroquinone developer is now a means to reduce materially the time of development without hindrance to the beauty of the negative, to about a tenth of the otherwise required time, this is certainly of great service to everybody, and I would therefore recommend to every friend of photography this developer, in Germany already extensively used.

Of all hydroquinone formulas which I have tested, I found none which admitted such a rapidity of development, and worked at the same time so economically, as the one recommended by me and published in the German journals, and which I have tried for months practically in the photographic gallery of Messrs. *Sike & Kuntze* at Potsdam, where I have to develop on an average from 20 to 30 plates daily.

This formula having met with favor in Germany as well as in England, is the following: *25 grms hydroquinone* are dissolved

in *750 grms of distilled water. 200 grms sulphite of soda* are added and dissolved also by shaking. The solution is then filtered and finally there are added to the same, 300 grms of *carbonate of potassium.*

Absolute purity of the chemicals is of the greatest importance. Particularly the sulphite of soda is oftentimès of an inferior quality distinguishable during the mixture of the developer by a sudden dark coloration and it becomes worthless.

One of the English journals recommends to boil the distilled water before use, to effect by this means a greater durability of the solution. As far as my experience goes, this seems to be indeed of favorable influence to the preservation of the liquid.

If the stock solution, which keeps in well corked bottles for about 14 days, and in completely filled and well sealed vessels for an indefinite time, is diluted with 5 to 6 times its volume of water, a developer is obtained which is about equal to the oxalate developer, only that it works a little quicker and can be used repeatedly. But if the concentrated solution is diluted with only double or three times the quantity of water, and to each 100 c. c. of the liquid are added 1 to 3 c. c. of a 40 per cent. caustic potash solution, a developer of a remarkable quality is obtained.

The same developes normally exposed plates (provided the temperature of the room is not too low) completely in from ½ to 1 minute, and will serve for many hours without the necessity of any addition. The writer has developed as many as 40 plates one after another in the same solution. Considerably over exposed plates are developed until they have become quite dense, and they are reduced afterwards with always good results. After some time the developer will naturally act somewhat *slower*, but not *harder*, and still much quicker than any other developer. I proceed generally in the gallery at present, as required during the time of the collodion proofs, that is, I develop each plate immediately after exposure and let the customer wait from one to two minutes. Thus I make always sure of securing a satisfactory negative.

It might be remarked yet, that the time of exposure, in comparison with other developers, can be considerably shortened and that an illumination of the portraits, rich in contrast, is recommendable.

After developing, and to avoid any formation of bubbles, the plates pass after a light washing into a pretty well concentrated

chloride of sodium bath, whereupon they are fixed. If an additional alum bath is desired, this can be applied only *after* the sodium solution.

It has also been recommended to add the chloride of sodium to the developer, and indeed this prevents frilling to a great extent without retarding the development, but then the developer will become useless after five to six applications.

If the developer, mixed with caustic potassium, is kept for several days, it is good yet, notwithstanding the brown coloration, but its action is considerably slower.

To substitute caustic soda for caustic potash and soda for potassium, is not advisable, if cheapness and quick and repeated development in the same solution is desired.

All kinds of photographic *papers* can be developed very conveniently in this way. But the development with addition of caustic potash is so rapid that its progress can be followed only with difficulty and it might be just as well to leave the caustic potash entirely out and to dilute the developer from 1:6 or 1:10. A better tone is obtained than with pyro and the black stripes and spots, being almost unavoidable with oxalate, are avoided.

Finally, this developer admits a shorter exposure than any other; time is saved by the rapidity of its action, and money is saved by the possibility of using for an indefinite period.

Who will try it?

SHORT PHOTOGRAPHIC NOTES.

By Paul Baltin.

OBJECTIVE SETS.

Objective sets are gaining friends daily in Germany, particularly the cheap Français set, which admits a combination of more than 20 focal distances, is almost indispensable to landscape photographs, being sufficient for plates of the largest sizes and leaving nothing to be desired.

HOW TO PRESERVE PASTE.

The meritorious astronomer and friend of photography, Dr. Lohse, in Potsdam, gives in *Liesegang's Almanack* for 1889 a simple, and for amateurs, valuable prescription to preserve starch paste. The pot containing the paste is simply placed under

a glass globe with another dish containing ammonia. Thus it will keep for months.

ZAPON VARNISH.

The Zapon varnish lately put into market deserves the highest consideration. According to E. Vogel, it is composed of 3 parts collodion cotton to 100 parts of amyl acetate. It has a greater power of resistance against moisture and mechanical damages than all other negative varnishes, and is applied in a cold state.

A FEW NOTES.

By Jex Bardwell.

In using pyrogallic for a developer, it is usual to add four times the quantity of sulphite of soda. So far as my experience with hydroquinone goes, I find that considerably more sulphite can be used to advantage, say from six to eight times. The meta-bisulphite of potash formulas I have not liked. I lately received from a friend a formula recommended by "Thomas," of London, for his plates, which I like very much. The formula is as follows:

1.

Hydroquinone	160 grains.
Sulphite of soda	2 ounces.
Citric acid	60 grains.
Bromide of potassium	30 "
Water	20 ounces.

2.

Sodium hydrate	160 grains.
Water	20 ounces.

FOR USE.

Equal parts of 1 and 2.

I tried to find some sodium hydrate, but could only obtain the common kind, so I made up a substitute, this substitute works so well that I give the formula, especially to those who cannot obtain the sodium hydrate C. P.

Take one pound of granulated carbonate of soda, C. P., and dissolve in forty (40) ounces of water, bring to a boil and add

about six tablespoonfuls of freshly slacked lime and boil for one half hour, and then filter hot, cleaning the filter of soda with a little hot water, then bring the quantity up to sixty-four (64) ounces (stock solution No. 2 *a*). This is a solution of caustic soda not pure, but holding in solution some lime, which is of more benefit than otherwise. In making up No. 2 of the above formula, it will read thus:

Water	18 ounces.
Stock sol. caustic soda No. 2 *a*	2 ounces.

After having obtained and tried some pure sodium hydrate, I give the preference to the substitute holding lime in solution. If used fresh (Thomas' formula) I find it develops quickly, with plenty of density, good color and clear.

I notice in an English publication and also in the journals, that in England they paint their hydrogen cylinders *red* to distinguish them from the oxygen, which is painted by one firm green, by another black. It is well known that in this country we paint the oxygen cylinder *red*, hydrogen *black*. A knowledge of this matter to lanternists coming to this country, or those going there, may perhaps prevent an accident. I think in such matters there ought to be some unity of practice.

I notice that most of the lanterns made here are furnished with plano convex condensers. In my practice I find them good for an oil lamp, but when using lime light they are not nearly so perfect as the Herschal condenser. It consists of a meniscus and a double convex lens. One evening using a biennial fitted with a pair of Herschal condensers, I had the misfortune to crack one, and the evening following I replaced them with a pair of plano convex that I had, belonging to a pair of oil lanterns, but I found so much difference in favor of the meniscus and double convex that I lost no time in getting them replaced. If it is a fact that this form of condenser is better fitted for the lime light (and I believe it to be a fact), why cannot they be obtained this side of England?

I notice that "J. H. Taylor," in a prize essay on shutters, remarks (Prosch's Duplex): "This shutter, however, has the defect of almost all shutters, that the duration of full opening is only momentary, and that the leaves sweep on with constantly accelerating velocity from the beginning to the end of the exposure, and finally, that at the end there is a great shock to

be suddenly borne by the lens mount." I use one and cannot detect the slightest shock, no matter how strong the spring. The shutter I have has four leaves when set for work, two leaves descend and close the opening, when set off the two leaves fly from the center, and the same movement cause the other two leaves to close to the center. There is a moment when the full opening of the lens is exposed, and whatever light is admitted during the balance of the exposure, is through the center of the lens, therefore it is but a question of the amount of light admitted ; that depends on the strength of the spring ; but it is through the center of the lens all the time, and in my (Prosch's) shutter there is no jar whatever.

ABOUT GOOD EXPRESSION.

By John Bartlett.

Every one who has ever had a portrait taken is conscious of a certain amount of self-glorification. It is so like having oneself recreated with all the modern improvements, that naturally one feels puffed up with delight in the reduplication of his majesty himself.

Now, it is just this self-consciousness which destroys what is natural and unaffected in our character and makes us assume a virtue whether we have one or not, and to mirror on our faces not what we in truth are but what we would have ourselves be.

We are anxious to persuade our fellow kin, subject to like passion, that we take no enjoyment in having ourselves limned forth for future generations, that the operation is unpleasant to us and that we condescend, only to gratify our friends. Yet within that brief interval of time while the chemical change is taking place in the sensitive film we would feign be an Adonis or an Ariadne. The very beggar or fakir in the streets, whose face has more lines of humiliation and dejection than a frilled negative, when invited into our studios and made to understand that we have discovered some elements of the picturesque in his make-up at once

"Drinks up the monarch's plague, this flattery,"

and reflects on his self-satisfied countenance the consciousness of his newly acquired importance. These pleadings of self against oblivion are almost pathetic. Who has not met troops of eager

ones who seek by every artifice to find a nook or corner somewhere in the scene we are endeavoring to photograph, though full well they know the improbability of ever getting a glimpse of the picture.

Is it any wonder then that the power to make a good portrait is sufficient to establish a painter's fame.

Michael Angelo did not paint portraits, we are willing to admit, but what glorious portraits has he given us in the statue of Julian de Medici and in the mythological sibyls and the prophets.

In his historical subjects as well as in the religious we find all those qualities in the highest degree which make a true portrait. Da Vinci's Mona Lisa, Titian's Mistress and Holbein's Erasmus are sufficient to show the wonderful powers these painters possessed, and yet what are these pictures, mere portraits? Mere portraits. Yes and no.

Mere portraits because they bring out the peculiar marks of originality—the permanent characteristics which indicate the disposition and the habits of the real self—more than mere portraits because they show the mind's discernment in the face.

The portraits which Reynolds and Van Dyke painted of the distinguished people of their day look very like the models they represented, or you may be sure the friends of the models would have protested, for the finest painting in the world if it be not a true likeness will never satisfy that vanity which is the common failing of the race. An idealized portrait, however beautiful, is not the man. There is something wierd about it, just enough of a resemblance to make it uncanny. We do not like to be left alone in a room with it.

A portrait must have depicted considerable of our earthy nature, the vulgar quality of faithful likeness, to give it even standing room in our candid appreciation of ourselves.

But what is this mirroring of the soul in the face and how are we to secure it along with the fleshy envelope—the muddy vesture of commonplace reality?

Leibnitz tells us : "All that takes place in Cæsar's soul is pictured in his face." We must look for the character in the expression and not judge of the traits of the man by generalizing on his features. Because the Roman soldier is represented with an aquiline nose should we expect all warriors to have a beak?

The Greeks never could understand how the soul of Socrates

was put in the body of Silenus, but doubtless the philosopher looked beautiful to his disciples when his great mind pierced through the disguise.

It is not meant that a portraitist should be a physiognomist or a phrenologist, but he should be able to judge of char acter through the signature of the features in action or in repose.

Thick or compressed lips, open or sunken eyes, straight or hooked noses, may enable one to roughly line out a disposition, but the nicer distinctions of character must be read from the expression, which often contradicts the assertion of the physiognomist. The human face is a most complex thing. It is not one nor does it remain for an instant the same when animated by thought. It is the stolid immobility of a wax head where the resemblance to the human skin is so perfectly counterfeited, which always disgusts us.

Not only does the light and shade upon the face change its expression every moment, but the slightest alteration of position indexes the thought going on within the mind. Each feature is in constant motion and contributes its share to the general expression. If, for instance, we should depict on one day the expression conveyed by the turn of the head or the look of the eyes, and the next day delineate the mouth expressive of a new state of mind, how incongruous the result would be. Yet this is just what mediocre portrait painters do, and then wonder why their sitters are dissatisfied with the result of their conscientious pains and toil.

They have not the ability to conceive as a whole the harmonious blending of the features. They have no imagination. Their portrait is a man of shreds and patches, a veritable human crazy quilt.

Photography at its worst is consistent in its delineation. The expression may be vapid, dull, stupid, silly, simpering, morose, ferocious, etc., but we find a concord in all the parts. A truthful portrait is a perfect reflection of the inner man at his best, and true portraiture is within the scope and power of instantaneous photography.

But the operator must be a man of culture, a man of refinement and taste, and must possess the power to divorce the attention of the sitter entirely from the idea that he is going to have his picture taken.

Originality in delineating the expression is kept alive only by observation.

An artist must be one in thought, word, and deed or he is unworthy his calling. Wherever he goes his eyes should be open to acquire something useful in his profession. It is a delightful study, to watch the play of emotion or thought upon the countenance. An omnibus or a railroad station is a theater with marvellous actors, each playing his part with consummate skill.

Do not err in imagining that human nature may not be studied within the narrow confines of even a village photograph gallery.

If the portraitist has no other resource than to judge of a man's moral or intellectual nature by his physique, he may yet guess truly at the character by observing some attitude or motion which reveals the disposition, and taking this as his cue, successfully call forth the true nature of the man.

To be painted or to be photographed, with the great mass of humanity, is synonymous with being put out of the natural environment in which they live and move and have their being. The preparations are elaborately made for the ordeal; the courage is screwed up to the sticking point, so as not to fail at the critical moment, the advent of which is announced by the operator with all becoming dignity, who stands beside his camera like a sheriff's clerk to take advantage of the distress of his victim.

Now it is just in the operating room—the very word reminding a sensitive nature of a clinic—that the skill of the photographer comes into play, in removing all constraint, in dissipating the feelings of nervousness or solicitude as to the result. Let the operator listen with all patience and meekness of soul, to the admonitions, the desires, the demands of his sitters; let him seemingly acquiesce, seem delighted with the suggestions, nay, even compliment the excellence of taste, the perfection of judgment, but withal, let him pursue his own way with diligence, knowing that the notions of the one who sits enthroned are but as sounding brass and tinkling cymbals to his attuned ear for the hidden harmonies he is all the time calling forth in the unconscious subjects.

And finally, when the glorified expression of self-satisfaction, the beauty of pleased vanity, the ripe perfection of delighted expectation are reflected upon the face let him squeeze the

bulb which releases the shutter, and leave the rest to the chemicals; and when the sitter comes to look at the finished work, let him acknowledge with all due resignation, with profuse gratitude, the exultant intimation that the success of the operation is due solely to his or her advice and suggestion.

Such a procedure may be a terrible extinguisher upon the operator's self-esteem, but if pride is above the desire for success let him give it better scope than it can have in the photographic professions. The perception of the beauty of animation which transfigures even a homely face under the treatment we suggest, is its own infinite reward. It is like gathering figs of thistles.

DARK ROOMS FOR PHOTOGRAPHIC ASSOCIATIONS.

By F. C. Beach.

An objection raised to the use of one general dark room for a large association of working amateurs is that one member is likely to interfere with the other, and that plates cannot be left to wash without liability of being handled and perhaps injured by careless persons. A system favored by many is the division of the space into a number of small rooms, on an average six feet square, which may be rented for one, three, six or twelve months at a varying scale of rates. Each room should be fully equipped with shelves, small lockers, sink and faucet, also with trays and baths for clearing and fixing solutions and other necessary conveniences, and if lighted by gas, should have a gas light just outside of the window facing the hallway. Furthermore the series of rooms should be carefully ventilated by a general pipe overhead connected to a chimney. There should also be registers in the floor connected with a fresh air pipe. In cold weather the rooms should be heated by steam.

On this plan a person can have a well ventilated private dark room, which can be under lock and key. He may leave his plates or prints to wash without molestation.

The accompanying diagrams illustrate roughly the general plan.

Fig. 1 is a plan view.

Fig. 2 is a side elevation.

Supposing one floor of a building is to be used for dark rooms,

referring to Figs. 1 and 2, *a* represents the rooms about six feet square. A partition runs along the center of the room, with dark rooms on each side. On the lower portion of the partition

Fig. 1.

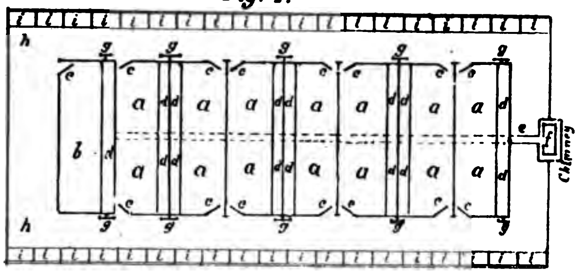
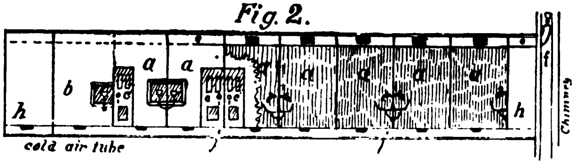


Fig. 2.



is secured the general waste pipe, into which discharges the branch wastes from each dark room. Similarly arranged higher up along this partition is the main water supply pipe, from which branches extend latterly to each room.

B is a general dark room to be used by any member of the association, fitted up with suitable sinks, washing sinks, trays, etc. *C* represents the doors of the several rooms. *D* are the sinks, which, it will be observed, are arranged back to back, so that it is only necessary to run a short T supply pipe from the latteral pipe coming from the main to furnish each room with water.

It is also an economical plan, as it saves extra plumbing.

E is the main ventilating pipe following the top of partition. Registers on each side open into each room, as shown in the small squares in Fig. 2. The dotted line represents this pipe in Fig. 1; it extends to the chimney *f*, in which a fire or suitable gas jets should should be kept burning, or a suction blower propelled by an electric motor, arranged to exhaust the foul air constantly from the pipe. Fresh air should be admitted at

the bottom by means of the flue *j*, having registers opening into each room. *G* are the gas burners arranged outside of each room. *I* are small lockers arranged along the walls of the halls *h*.

Some time ago a plan for a general dark room which I described was arranged with divisions, like stalls at each sink. This has its advantages, in that the person working at the next sink cannot spatter hypo or other chemicals on his neighbor's plate. In practice it is found to work well. But where the amateur has considerable work on hand and wishes to leave his negatives and plates intact, the separate, independent dark room system is undoubtedly the best. My ideal light for a dark room is the incandescent electric lamp. It is used exclusively in several large dry plate factories.

Conveniently arranged, well ventilated and fully equipped dark rooms will assuredly form one of the chief attractions in the quarters of any photographic association; as much so as a well appointed gymnasium is in an athletic club.

A FEW EXPERIENCES IN ENLARGING.

By R. A. R. Bennett, B. A. (Oxon.).

I have lately been making some very satisfactory enlargements by means of one of Lancaster's "Instantograph" cameras, and as these are very popular instruments at the present time, I think others may like to hear of the difficulties which I had to surmount and how I got over them. Of course the same arrangement can be utilized with any camera of the same pattern, that is it should have brass flanges on which the double backs slide.

In the first place, the window of the room has to be darkened, and this is by no means so easy as it appears to be when first attempted. The first book I took up on the subject looked at the matter from a rose colored point of view. "The only thing necessary" said this manual, "is to provide a thin board to fit the lower half of the window, on which the necessary carpentering is performed; the rest of the window is then easily darkened by curtains of black twill or sheets of brown paper." "Here," thought I to myself, "is a plan which seems the acme of simplicity," and I "went for" all the curtains and sheets of brown

paper in the house. But somehow things did not look so promising when I found that the window of the only available room measured five feet by two feet, and the largest sheets of brown paper obtainable were not more than one-quarter of the required size Now, supposing the thing can be done at all with loose sheets of brown paper, which could only be at the expense of much time and trouble, one piece of paper could only be used a very few times, for the creases caused by the necessary folding of the paper soon wear into holes. Moreover, speaking personally, my patience is not equal to nailing up multitudinous pieces of brown paper and rugs at each operation, which takes about half an hour to perform, while the actual enlargement takes about ten minutes to make. I therefore speedily resolved to invent a plan whereby the window could be darkened more easily, and the fruits of my cogitation I lay before my readers.

Have a stout board (say not less than half inch thick) cut to fit the lower half of the window broadwise, and a frame work made for the top of the window ; both being of such a size that, when the framework is placed on the top of the board, their combined height is exactly equal to that of the window inside the window frame. The frame is now covered with stout brown paper in which, if any holes appear, more paper must be pasted over them. The window is now nearly darkened, but it is necessary to make some arrangement to hold the frames in their places. For this purpose take four pieces of wood about 7 ins. by 1½ in. by ½ in. and bore holes at about two inches from one end. These are now to be fixed by screws through the holes, to the inside of the window frame, at a distance of about five inches from the frames. It is now obvious that, when the strips are turned into a horizontal position, they will hold the frames tightly pressed against the sash of the window, but when turned up vertically they will be out of the way, and allow the frames to be removed from the window. The window can now be entirely darkened in a few seconds by putting up the frames, and the frames can be removed in an equally short time when the room is wanted for toning operations, etc.

In addition to the board, I have another frame of precisely the same size, which is covered with "ruby fabric" (two thicknesses). This is substituted for the board when I wish to use the room for development, and a good light is thus given over the whole room and at the same time it is perfectly safe even for extra rapid

plates. I much prefer this plan of converting an ordinary room into a dark room; for the fumes of various chemicals are so unwholesome that every dark room ought to have a window which can be opened wide when not in use.

It will very likely be found that even if the frames fit tightly against the window frame, a large amount of light manages to get round their edges. To prevent this, several thicknesses of cloth should be nailed along the edges on the under side of the frames, so that when the frames are in position the cloth is tightly pressed against the sash of the window on one side, and the frames on the other, this will entirely exclude the light if carefully carried out. Knots in the board should be avoided, a knot is always semi-transparent and lets the light through. All knots and small holes should have pieces of thick brown paper glued over them.

If the window is surrounded by tall trees, houses, etc., so that an uninterrupted view of the sky cannot be obtained, it is necessary to hang a sloping board covered with white paper, outside the window, so that the light from the sky is reflected through the hole in the board in front of which the negative is placed. But, unless this reflector is very large, the illumination will not be even, and therefore it is far preferable, when the trees or houses are at some distance off, to incline the board itself at such an angle as will enable the observer to see nothing but sky when looking through the opening at a short distance from the board. There will then be no shadows to interfere with the even illumination of the picture. A point can easily be found by inclining the board at different angles when the negative and camera are in position, at which this is the case. The board should be supported by small slips of wood fastened under it by screws to the window frame, in a slanting direction, and can be easily lifted off these when required. A space will be left between the upright frame and the slanting board which can be covered over by tacking a large piece of black twill, or other opaque material, to the bottom of the upper frame; this can then be adjusted by folding it over the top of the sloping board, so as to cut off all the light which enters between them.

The opening for the negative must be cut very slightly smaller than it, and the negative can be kept in position by a small ledge glued to the board to support it, and two small movable buttons at the top to keep it from falling over. The adjustment of the

camera is rather intricate, but a little ingenuity will show how to do it in practice. I will describe it as clearly as I can. Round the opening for the negative glue four strips of moderately thick wood, so as to form a frame of the exact size of that of the back of the "Instantograph," where the slides are put in, when the ground glass screen is pushed back over the top of the camera. Two brass strips are now to be nailed along the top and bottom strips of wood, in such a way that they project over the edges the whole of their length. The camera will now slide on from one side, just as the dark slides do, and the brass flanges of the camera, catching in those of the frame, the camera is held firmly in front of the negative (which is of course placed in position before the camera is adjusted), and this in no way interferes with the moving of the front of the camera for focussing, the screws not having been altered; moreover the screw at the back of the tail board can still be used for "fine adjustment." If the frame on the board is covered with cloth, no light ought to escape between it and the camera. If it does so, put a black cloth right over the join.

The bromide paper is of course to be supported on an easel in front of the camera in the ordinary way, on a board preferably covered with cork. Ordinary pins, not drawing pins, must be used, as the heads of the latter protect the paper beneath them, and the manipulator will consequently be exasperated to find four large circular white spots at the corners of his prints, if these are used.

I do not think it necessary to describe details of the practical part of the enlarging, as they have been so often given before. I generally use the "Ilford" bromide paper and find it very good. Photographers "over the water" will naturally use Eastman's, which is very much slower, though equally satisfactory.

NEW CENTRIFUGAL SEPARATOR WITH CONTINUOUS ACTION FOR GELATINE EMULSION.

By Ed. V. Boissonnas, Geneva, Switzerland.

The centrifugal separator which forms the object of the present paper is an apparatus analogous to a centrifugal drier, but employed by manufacturers who want to separate relatively heavy matters suspended in a liquid; for instance, the bromide

of silver contained in a gelatine emulsion for the manufacture of dry plates.

Hand power, steam or electric machines of this kind used at the present day, have the drawback of compelling the operator to lose a great deal of time on account of the time (15 to 20 min.) necessary after each operation to stop the rotary basket in which the separation is made. This stoppage cannot be executed rapidly without destroying the effect of the operation, which consists in projecting against the side walls of the basket of the relatively heavy matters contained in the mixture introduced. Another inconvenience is, that even a slow stopping of the rotary basket will be of no avail, as its motion will cease quicker than that of the liquid it contains, thus destroying the effect of the separation produced by the centrifugal force.

It has been attempted to remedy this evil by placing in the rotary basket some flaps in order to stop the liquids at the same time that its motion ceases. These flaps are very inconvenient and do not answer the purpose.

The system of my separator, being of continuous action, avoids both troubles already stated, because it permits extracting the liquid from the rotary basket as soon as the operation of separating the matter has gone far enough, and it permits also a filling up again without stopping its movement.

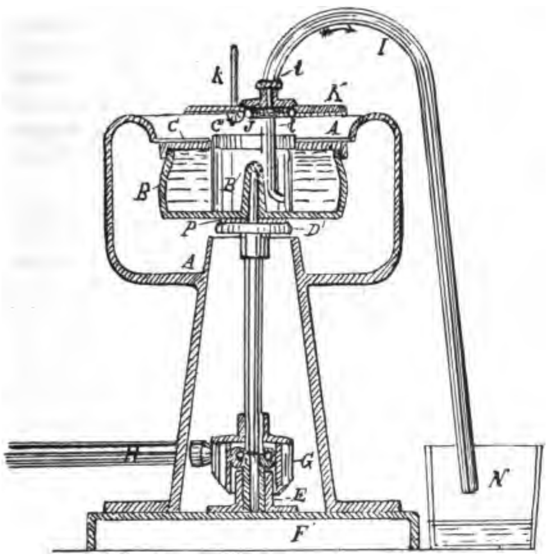
I obtain this result combining a contrifugal machine of known system with a syphon placed in such a position as to allow the careful extracting of the liquid contained in the rotary basket without producing any ripple in the moving liquid. Besides, I have connected the axis of the basket with a small turbine of tangential action, which would be advantageously used with the machine wherever a sufficient pressure of water can be obtained.

The accompanying drawing represents in vertical section and horizontally a continuous separator of my own system with turbine power.

A, is a protective cover having nothing in particular, and similar to all other separators, only that I use its outside surface to sustain my system.

B, is the rotary basket with the cover C having an opening C^1. The basket B has a central tubular socket B^1, through which the basket B is adjusted to the upper spindle of the axle D. The basket B lies on a leather ring P, fixed on a disk D^1,

pertaining to the axle D, the lower spindle of which rotates in a small socket E, placed on the supporting board F. A tangential



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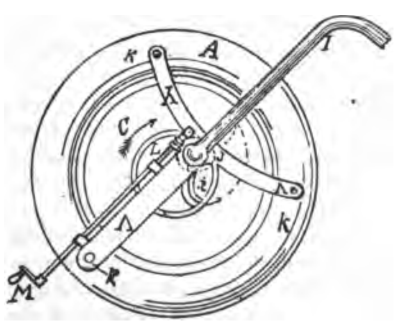


turbine G is fixed at the bottom of the axle D, and is acted upon by water under a pressure, reaching the turbine through a

water-pipe H, and passing out of the machine through an aperture placed either in the wall A, or in the supporting board F.

The solution, which we want to operate with, being poured into the basket B, forms by the centrifugal force, a hollow space in the vertical section, Fig. 1. It is in this empty space of the solution that I place the elbow *i* of my syphon I; this elbow *i* is bent so as to continually absorb the liquid tangentially to the vertical walls of the hollow space formed by the moving solution.

As the liquid is being extracted, the end of the elbow *i* must be brought nearer to the cylindrical wall of the basket B. This may be done by hand, or a catching gear as shown in the drawing. In the latter the elbow *i* is supported by the catcher K, fixed on the upper surface of cover A, having vertical joints *k*. The elbow *i* has a wheel J gearing with an endless screw L, moved by a handle M, serving to turn very slowly and regularly the elbow *i* in the direction of the arrow in Fig. 2. The solution turning in opposite direction ascends in the tube *i* and passes out of the apparatus through the syphon I into the vessel N.

ORTHOCHROMATIC PHOTOGRAPHY.

By C. H. Bothamley, F. I. C., F. C. S. of the Yorkshire College, Victoria University.

In the Jubilee Year of the photographic negative it will be of interest to give a concise summary of the points which may be taken as definitely established in orthochromatic photography, the latest development of the art:

The addition to a sensitive film of certain coloring matters, which are known as *optical sensitisers* or *selective sensitisers*, renders the film sensitive to rays which would otherwise produce little or no photographic effect. This fundamental principle was discovered by Vogel in 1873.

The rays to which the film is thus made sensitive are rays which the film would not absorb under ordinary conditions, but which it can absorb after treatment with the dye. These rays are almost identical with the rays which are absorbed by the particular dye used as a sensitiser, but the absorption bands are somewhat displaced towards the red end of the spectrum.

The only dyes which are of practical value are those of the eosin groups, especially eosin itself, erythrosin and Rose Bengal, and two dyes derived from quinoline, namely, cyanin and quinoline red. Chrysaniline is also useful as a sensitiser for green and bluish-green.

Eosin sensitizes for green and yellowish green ; erythrosin for yellowish green aud greenish yellow ; Rose Bengal and quinoline red for greenish yellow and yellow ; cyanin for yellow, orange and red. Erythrosin is the most powerful sensitizer, especially if used with ammonia, and is the best sensitizer to use for landscape work. It gives, however, too great sensitiveness for yellowish green, and very little sensitiveness for orange red. Rose Bengal is less powerful, but gives truer orthochromatism. Cyanin, or a mixture of it with Rose Bengal, erythrosin or quinoline red, is indispensable for any subject which contains much orange or red.

The sensitizers may be mixed with the other materials before emulsifying, or may be applied to the prepared plate in the form of a dilute aqueous or alcoholic solution (1:10,000) with or without 1 per cent. of ammonia. Erythrosin, Rose Bengal and cyanin will give a considerable effect without any ammonia, but the greatest sensitiveness can only be obtained when this alkali is used.

Plates prepared with an ammoniacal bath are much more sensitive than those in which the sensitizer has been added to the emulsion, but they are deficient in keeping qualities. They have a considerably higher *general* sensitiveness than the same plates before treatment with the sensitizer.

Instead of the ordinary eosin dyes the silver derivatives may be used and give even greater sensitiveness.

In order to obtain true orthochromatism it is always necessary, with gelatine plates at least, to interpose a transparent yellow screen somewhere between the object and the plate in order to cut off a certain proportion of the blue and violet rays, to which the plates still remain relatively too sensitive. The tint and intensity of tint of the screen, *i. e.*, the proportion of blue and violet to be cut off depends upon the subject and upon the result which it is desired to obtain. If the tint of the screen is too deep the results will be as incorrect in one direction as those on ordinary plates are in the other. For landscape work the tint of the screen should not exceed pale lemon yellow; but

difficult subjects, especially those containing much orange and red, require a screen of deeper tint.

All operations must be conducted in a ruby light of the lowest possible intensity.

In photographing paintings, flowers, pottery and all similar obects, and in photomicrography, orthochromatic plates have become indispensable. In landscape work they possess very great advantages, the improvement being most strongly marked in the rendering of foliage, water and distance, and many operators testify to the advantages gained by using them for portraiture.

TO DETERMINE THE TIME OF A MOMENTARY EXPOSURE. LIMITS OF EXPOSURE.

Lieutenant C. L. Bruns, U. S. Navy.

To determine the time of a momentary exposure it is necessary to understand the instrument you are using. Therefore determine the equivalent focus and mark it on the tube of lens; measure carefully the diameter of each stop. Then divide the equivalent focus by the diameter of each stop successively and mark the quotient on its respective stop. Thus, if the lens has an equivalent focus of 5 inches and the stops $\frac{1}{2}$, $\frac{1}{4}$ and $\frac{1}{8}$ of an inch in diameter, we have $5 \div \frac{1}{2} = 10$ or *f.* 10, *f.* 20, and *f.* 40, respectively; having marked these *f's* on their respective stops, they will indicate that when *f.* 10 takes one second to properly expose or actinize a plate, *f.* 20 will take four times the time or four seconds, and sixteen seconds if *f.* 40 was used, all other conditions being similar.

The quotient of the equivalent focus divided by the diameter of a stop, the writer terms a focal rapidity as it represents a relaative rapidity.

A theorem may here be introduced ; thus the squares of the focal rapidities $\left[\frac{\text{eq. focus}}{\text{diameter of stop}}\right]^2$ are directly proportional to the times of exposure.

Thus, if *f.* 10 requires one second, what exposure will *f.* 40 require under parallel conditions. Thus, $f.\ 10^2 : f.\ 40^2 :: 1 \text{ second} : x$ or 16 seconds. Having made the above measurements, we may now determine the time of a momentary or shutter exposure, or at least know it to be between certain well defined

limits. We will proceed to explain by means of an example.

Suppose the lens of the camera to be five inches equivalent focus and stop one inch in diameter, the focal rapidity being $5 \div 1$ or *f.* 5, the shutter being set to some fixed but unknown speed, a shutter exposure is made, which upon development is found to have been correctly timed. Required the time of exposure.

Follow immediately this experiment with another exposure, using some small stop by which the shutter may be dispensed with; let us say the usual working stop is $\frac{1}{8}$ of an inch in diameter, or $5 \div \frac{1}{8}$ or *f.* 40, the subject, plate and development being the same. It is found that four seconds gave a properly timed negative. Upon examining the two negatives side by side they are found to possess the characteristics due to equal actinization.

From the theorem before stated we have $f. 40^2 : f. 5^2 :: 4 \text{ sec.} : x$, solving we find $x = \frac{1}{16}$ of a second. The question is now what is the degree of dependence, assuming the subject, plate, and lens to be the same, and exposures made following each other, both plates developed in one development. Finally having noted carefully the field in focus with the large stop, that part being the point of comparison with the negative whose exposure was made with the small stop, then if these conditions have been successfully carried out, it may be concluded that the exposure, $\frac{1}{16}$ of a second, is practically correct, except an error, or personal error in judgment, as to similar actinization. Suppose in the above example, $f. 1600 : f. 25 :: 4 \text{ sec} : \frac{1}{16}$ sec, and assuming four seconds to be the correct time of exposure, follow immediately an exposure giving three seconds and another of five seconds, all under the same conditions, and all four plates developed at one time in one development.

These represent exposures, particularly when made on a subject with which you are photographically familiar, which will easily include the correct exposure. These plates after development are compared with the negative of shutter exposure. It will be seen that the latter lies somewhere between the negatives of three seconds and five seconds, or thirty and fifty seconds, as the range would be in the latter case had still smaller stops been used. Thus we have in each case:

$f. 1600 : f. 25 :: 3 \text{ sec.} : \frac{1}{21}$ sec. nearly.
$f. 1600 : f. 25 :: 4 \text{ sec.} : \frac{1}{16}$ sec.
$f. 1600 : f. 25 :: 5 \text{ sec.} : \frac{1}{13}$ sec. nearly.

It may be safely concluded that the period of shutter exposure lies between $\frac{1}{18}$ and $\frac{1}{81}$ part of a second, when determined by the average observer, and it is easily seen a closer approximation is attainable.

An important application of this period of shutter exposure is described as follows :

This time $\frac{1}{16}$ of a second with *f*. 5 and this fixed shutter movement, is equal in actinization, and relative in time of exposure to the four seconds of exposure above cited. The ratio of four seconds to $\frac{1}{16}$ of a second or as $1 : \frac{1}{64}$ will be invariable, provided equal actinizations be secured on any one particular subject, whether that subject be any marine view or landscape. Therefore being invariable, and a constant, mark it on the camera for future record. It is evident that if the shutter speed is changed or its aperture in any manner changed a new constant must be obtained to meet with the new conditions. The conditions of this constant bring $\frac{\text{equivalent focus 5 inches}}{\text{diameter of stop 1 inch}}$ and $\frac{1}{16}$ of a second, for convenience let this equation be called "The Equivalent Shutter Exposure." It is readily seen, that if it is desired to change the time of exposure, as for example to increase the time of exposure, it may be done by relaxing the tension of the spring and thus cause the shutter to move slower, or to reduce the diameter of the stop. In the latter case it can be readily done, and to a known degree ; therefore differences in periods of exposure will be made by changes of the diaphragm aperture only. Thus to change the period of exposure in the equivalent shutter exposure, the equation would become $\frac{\text{equivalent focus 5 inches}}{\text{diameter of stop } x}$ and $\frac{1}{16}$ of a second. This equation as changed is called the "Undetermined Equivalent Shutter Exposure," in which x, the diameter of aperture of stop, is to be determined.

Let us now suppose, that a number of equivalent shutter exposures for a series of specific and characteristic views, have been determined, among which is found the equivalent shutter exposure for a particular marine view, to be *f*. 20, and $\frac{1}{64}$ of a second. What must be the diameter of x, in the undetermined equivalent shutter exposure, $\frac{\text{eq. focus 5 inches}}{\text{dia. of sto p } x}$ and $\frac{1}{16}$ of a second, in order that if exposed under parallel conditions, an equally

actinized or properly exposed negative will result. We have from the theorum before annunciated:

$$f.\ 20^2 : f.\left[\frac{\text{equivalent focus 5 inches}}{\text{diameter of stop } x}\right]^2 :: \tfrac{1}{64} : \tfrac{1}{16}.$$

We have all the parts known in the proportion except the diameter of stop in the undetermined equivalent shutter exposure, solving we find that $x=\frac{1}{8}$ of an inch. Therefore the undetermined equivalent shutter exposure becomes

$$\frac{\text{equivalent focus 5 inches}}{\text{dia. of stop } \frac{1}{8} \text{ of an inch}}$$

and $\frac{1}{16}$ of a second, and is now the equivalent shutter exposure for that marine view. That is, exposing with a stop $\frac{1}{8}$ of an inch in diameter will give an equally actinized plate, with the standard, *f.* 20 and $\frac{1}{64}$ of a second.

THE VARIATION OF EXPOSURE OF SAME SUBJECT DURING DIFFERENT PERIODS OF THE YEAR.

If on the 21st day of June on the Equator or latitude 0° the time of exposure required is one second, then on December 21st, other conditions being the same, the exposure would be the same or one second. That is, there would be no difference in the times of exposure, and the exposures on these dates would be longer than on any other date during the year. While on March 20th or September 22d the period of exposure would be the shortest during the year, other conditions being the same. And generally it may be concluded that when the latitude and the declination of the sun are equal and both of the same name, that is, both being north or both south, the period of exposure is the shortest, while when they are of different names and most widely separated, the period of exposure is the longest, other conditions being the same.

In latitude 41. N., or latitude of New York City, if it required one second on June 21st to properly expose, for a given subject, plate, etc., etc., then on December 21st it would require to properly expose, two and one-half seconds, subject, plate, etc., etc., being the same.

While on the North Pole if it required one second on June 21st it would require an infinitely long exposure to properly expose on December 21st.

From the above it may be concluded, leaving out atmospheric conditions and local irregularities, that the difference between

the times of proper exposure on the 21st of June and the 21st of December becomes greater as the latitude increases, being 0 seconds at equator, 2½ seconds in lat. 41° N., and an infinite time at the pole. These differences if tabulated by each photographic society for its home latitude for each month of the year, would be of much scientific importance. There are tables published, but with the latitude and locality omitted they are of little value.

In reference to the minimum and maximum time of exposure on some particular subject, the latter is three and one-half times the former. That is, if at noon under most favorable conditions, a particular subject required one second exposure, then on some proximate date during a northeast storm, sky overcast and cloudy, high wind and raining, other conditions being the same, three and one-half seconds would be necessary to similarly actinize a plate.

There are now two conditions fairly established: first, that under parallel conditions in this latitude, it requires at noon two and one-half times longer exposure on December 21st than on June 21st to equally actinize a plate. Second, subject, plate, etc., etc., being the same, it requires three and one-half times more exposure, under most unfavorable photographic conditions, than it requires under the most favorable conditions.

In determining the above conditions particular attention was paid to development, the strength of developer and character being the same throughout. The condition introducing the least irregularities due to difference in development, and which the writer has followed where possible, was to develop the plates to be compared in one tray and in one development.

In conclusion, it may not be out of place to say a few words on the intensity of the sun's light, and its power of illumination, not however in a scientific sense, but rather photographically.

It is a well known fact that the atmosphere, under certain conditions, has a selective absorbing power on rays of light, producing from yellow the appearance that its source is red, and of white light that its source is yellow. This condition is in its maximum when the source of light is on the horizon, and on which rests a belt of thick and highly refractive media. This condition may exist, even when the sky above is free and clear. These ill conditions are particularly applicable to the sun, and doubtless, its luminous power and intensity are much affected thereby. With the sky clear the before-mentioned ill conditions

Engraved by the "MOSS-TYPE" Process, from a photograph from nature,
Moss Engraving Co., 535 Pearl St., New York.

LULU.

practicaily cease at sea, when the sun's altitude is not less hanten degrees (10°). While on land these ill conditions manifest themselves during a longer period, depending on the locality.

The writer has observed that when the sun is not less than two and one-half hours high, these ill conditions practically disappear. The time of exposure for a distant landscape is the same during the entire day until the sun reaches a point two and one-half hours from setting; he therefore concludes that the intensity of the sun is the same between those intervals.

For near views, the times of exposure become less as the sun approaches the meridian, the shadows in the near view becoming shorter as the sun increases in altitude, and as shadows become less illumination increases. Thus at noon the sun's power of illumination reaches a maximum and is the time of shortest exposure for near views. Therefore it may be concluded that after the sun passes the refractive belt near the horizon, the intensity remains the same until it passes again into the refractive belt.

Illumination is dependent on the altitude of the sun, and is greatest when on the meridian.

BROMIDE PAPER FOR DRAUGHTSMEN.

By Jno. G. Cassebaum.

A field for bromide paper, which seems has so far not received the cultivation it should have, is to be found in the drawing rooms of our architect, machine shops, etc., in short, in all places where blue prints are made for duplicating designs. About two years ago a friend, who has charge of the drawing room of one of our large machine shops, complained of the trouble he had in not being able to get blue prints of some of his designs in as short a time as desired, the weather being very cloudy and requiring such long exposures, that in some pressing instances he found himself compelled to make duplicate drawings, consuming very much of his valuable time. I suggested bromide paper and gave him instructions in using it, and although the price of bromide paper is higher (as compared with the cost of blue prints), it has ever since been used in his establishment, not only because they can make duplicates of their designs at any time and quickly,

but also tracings can be made from much heavier paper than blue prints would permit.

The introduction has paid my friend's firm in another way, bromide prints, owing to their novelty in this line, have attracted the attention of parties to whom they have been sent and, in place of being carelessly overlooked and pigeon holed, had the desired effect of being closely examined and brought orders.

CARBON PICTURES ON OPAL.

By G. Hanmer Croughton.

It has been a matter of considerable surprise to me that carbon printing has not been practiced to any great extent in America. The process is not a difficult one to learn and the results are so beautiful that I think they have only to be seen to become popular.

One of the prettiest applications of this process is the Opal Carbon, and with reversed negatives it is the simplest process I know ; for ordinary negatives, to get a non-reversed picture, you must resort to what is known as the double transfer process This is not more trouble than the transferrotype process ; it was, in fact, my familiarity with the double transfer carbon process which first suggested to me the transferrotype.

If the photographer wishes to make a reversed negative for the single transfer process, he could not do better than to make it upon the new flexible negative films and print through the back, when a non-reversed image will be the result. But I will give details for working both processes.

The materials required are carbon tissue, which I think can be obtained of Anthony & Co., bichromate of potash and hot water are simple enough.

The carbon tissue is made of any color, warm black, engraving black, red chalk, sepia or blue. The operations are alike with all colors.

SINGLE TRANSFER PROCESS.

The first operation is sensitizing the tissue, which is done by immersing it in a bath of bichromate of potash 15 grains, water one ounce, or bichromate of potash 10 grains, bichromate of ammonia 5 grains, water one ounce. The last formula gives a more sensitive tissue but it becomes insoluble quicker.

Cut your tissue to the size wanted, see that it is thoroughly immersed in the liquid and that no air bells are upon either back or front; sensitize for three minutes, or longer if the tissue still continues to curl when that time has expired.

Hang to dry in a cool, dark room; do not try heat to hasten the drying. When thoroughly dry it is ready for printing; place the tissue side in contact with the negative; if the picture is not to be vignetted place a strip of semi-opaque paper, about ⅛ of an inch wide, all round the negative. This will form what is called the safe edge and will prevent the picture from washing up at the edges; if a vignette, the white ground round the picture serves for the safe edge.

The time of exposure can only be determined by actual experiment. For ordinary negatives from 3 to 7 minutes in the sun has been sufficient under tissue paper. When you take your print from the printing frame put it into cold water till quite limp; you can change the water till all the free yellow bichromate is washed away, then put in your opal plate and bring your tissue into place over it and take them both out of the water; bring the tissue into intimate contact with the opal with a squegee and put on one side with a piece of blotting paper over it and a flat weight on that; leave from 10 to 30 minutes.

Then immerse in hot water about 30 degrees F. and with a brush or tuft of cotton brush off the little air bells which will form on the paper; gently press one corner; if the color of the film can be pressed out, it is ready for the removal of the paper backing; gently lift one corner and with an even pull strip it off; rock the dish backward and forward, and the soluble gelatine and color will come off, leaving the picture in all its beautiful gradations upon the opal.

The result can be modified during these manipulations to quite a considerable extent. For instance, if the image appears to be under printed, cool off the water and do not carry the operation as far as it will go; but if over printed use hotter water and lave the print with it continually. I have even gone so far as to pour nearly boiling water with considerable force upon parts of a picture I have wished to lighten.

Rinse in cold water and place for five minutes in a saturated solution of alum; rinse again in cold water and put in a rack to dry.

DOUBLE TRANSFER PROCESS.

For this you will want the flexible support which is sold with

the other materials ; it is a paper prepared with an aqueous solution of shellac. This paper must be prepared by rubbing over it a small portion of the washing solution sold for the purpose, or of a mixture of beeswax in benzole, 5 grains to the ounce. This must be polished with a brush ; rub with a soft cotton rag ; the operations of sensitizing and printing having been performed as described for the single transfer process, put your flexible support into the water under the tissue in the same manner as described for the opal, and bring tissue and support out of the water together upon a glass plate larger all round than the tissue, and use the squegee as before; go through all the before-mentioned operations with the hot water just as if the picture was upon the opal instead of the paper, but omit the alum bath.

You have now a reversed image on a paper support, it can either be transferred at once or be allowed to dry and transferred at leisure, but it is best to allow it to dry, as the image will be sharper, and the paper shrinking to its original size there will be no stretching of the image.

To transfer, coat your opal with gelatine 5 grains, water one ounce, saturated solution of chrome alum 1 minim. This must be flowed on like coating a plate with collodion and must be allowed to dry.

The second transfer is effected by placing your opal plate (coated as above), into water, the temperature about 70° F., the print on the temporary support being put into cold water till thoroughly limp. The face of the plate must feel slimy, when the two surfaces can be brought into contact and squegeed together, and put in a cool place to dry. When thoroughly dry the temporary support will come off of itself and leave the picture on the opal. The support can be used again after removing.

Pictures produced in this way are undoubtedly permanent, and as the tissues are made in various colors you have a diversity of tint unattainable by any other process.

ROCHESTER, N. Y.

KITS THAT COST NOTHING.

By Charles H. Davis.

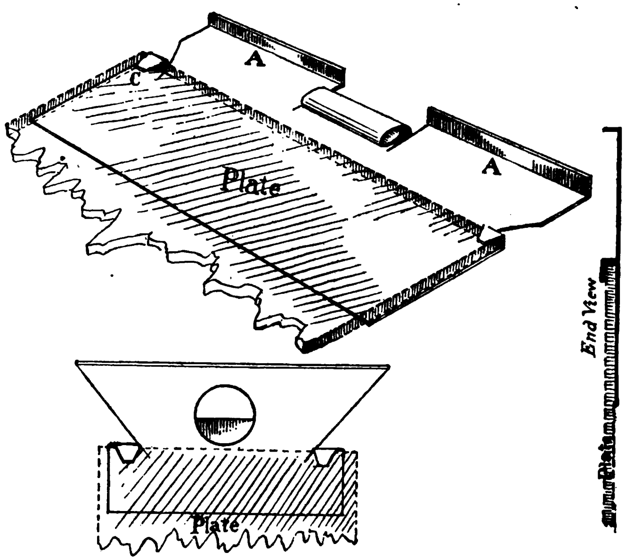
I had occasion last summer, while far away from any dealer, to replenish my stock of plates. My holders were 5x8 in size

and of a late pattern, holding the plates only at the ends. I tried in vain to get the required size at many photographers and in several towns, but only one size—5x7—could be had. I was without kits, and the new fangled holders made plates an inch shorter than my holders totally useless unless I could devise a way to hold them in. After a short season of acrobatic exercise with my brains, I evolved a scheme for kits which then proved so useful, and has since been so much applauded, that I have resolved to donate it to the beloved brethren who, like the wise men of Athens, are always uneasily searching for some new thing. The illustrations make the construction and use plain. To make a kit to hold a 5x7 plate in a 5x8 holder, cut out a piece of tin about 3 inches wide by 5 in length; make two cuts in one side near the middle an inch or so apart, rolling the tin between the cuts back, to form a smooth edge, as shown in the illustration at B. This is to press the finger upon when inserting a plate in the holder. The remaining portions of this edge, each marked A, are to be turned up to about the average thickness of a plate. Now, at each end of the tin, beginning three-quarters of an inch from the turned up side, make diagonal cuts towards the uncut edge of the tin to the depth of about one inch. The points thus made are first clipped square and then turned back, forming clips to receive the edge of a plate. A good plan is to take an old plate of average thickness and use it as a guide for the clips. See that the distance from the clips (marked C) to the edge previously folded up is exactly one inch. This done the kit is ready for use. The folded edge maintains the face of the plate at its true position in the holder.

It may be objected that this device places the plate at one end of the holder entirely. So it does; but by always placing the tin at the same end of the holder, and having a mark on your ground glass, there can be no danger of losing any part of a picture. If it is desired to make kits for larger sizes, it is only necessary to vary the distance between the clips and the turned edge; and again, if the holder is wide and the plate narrow, let the tin be made full width and tapered to the width of the plate as shown in the annexed cut, thus preventing side motion. Always leave enough tin projecting below the clips to bear upon the spring sometimes placed in holders to force plates up into position. By this means the tin lies smoothly against the back of the plate, holding it accurately and securely.

The writer made twelve of these kits in thirty minutes in a country tin shop, after I had evolved the original one, and the cost was ten cents. Many adaptations of this idea, even permitting the use of one-quarter plates in the center of 8x10 holders, might be made. It may cause a coldness between kit makers and the subscriber, but I advise the festive brother amateur to make his own kits and save his money to buy plates in order to test the "last new formula for development."

I have since inquired of the various large makers, for kits to hold 5x7 plates in 5x8 holders, and find that none are to be had. The value of this scheme will therefore be apparent.



Another scheme for the homemade amateur who is dissatisfied with the foul-smelling and disagreeable lanterns offered for sale is to construct his own dark-room lantern, also at very small cost. Procure a starch box, about 10x14x10 inches in size, the kind that has a sliding cover. Bore about 8 one-inch holes in one end close to the sides. Insert a false end, kept one-half inch from the other by small strips of wood. This false end, which is to become the bottom, must also have a like number of holes, but

nearer the middle. Cut a hole 4 inches square in one side, and cover inside with ruby glass and outside with ground glass; cut a like hole in the opposite side, and cover with ruby glass inside and post-office paper outside. In the groove where the cover was placed, insert a sheet of ruby glass, or, if this costs too much, insert in the wooden cover a 6x8 or smaller piece, though a full-sized sheet is preferable. Now set the box up on the double end, make 5 holes one inch in diameter in the top close together, and over them on the inside place a false top made of tin bent so as to allow the hot air to escape through the holes without leaking light. You have now, by placing inside a 25-cent kerosene lamp, the most desirable dark-room lantern possible. By fastening the lantern to a block larger than the box bottom by means of a screw passing through the center of the bottom of the box, the whole lantern can be revolved, so as to give you any desired light without manipulating the wick, thus avoiding smoke and soot. The ruby and ground glass, the ruby alone, or the dimmer ruby and orange combined, each available in an instant by turning the lantern, will be found a great convenience and pleasure. I made such a lantern for less than a dollar, and would not exchange it for the best high-priced all-tin affair on the market. Ample air for the lamp is all that is necessary, and this can be secured by placing the ventilating holes so that they are not opposite each other, thus guarding against a leakage of light.

A SIMPLE METHOD OF COPYING.

By W. T. Demarest.

Like many amateurs in photography my ambition has always greatly exceeded my income, and I have frequently had to devise means to accomplish results which would be easily attained by one possessed of suitable apparatus.

I had frequently desired to copy cabinet size portraits, but as I had only a single landscape lens of about nine inches focus and a view camera of eleven inches length of bed, it was impossible to make the copies large enough to be of any practical use.

Having a single lens of six inches focus also in my possession, it occurred to me to mount my six inch lens before the nine inch and see what the result would be.

I placed the smaller lens in front of the larger in such a way that the diaphragm slot of the larger tube would he half way between the two lenses. The combination thus made had a very short focus, but was exactly what I needed for copying, as I was able to make a full size copy of a cabinet card, and also to enlarge a sharp and clear carte-de-visite to the full size of my plate (5x7).

I would advise any amateurs who own a couple of lenses to try my plan as they will find many profitable ways to make use of the combination in photographing and enlarging small pictures and articles.

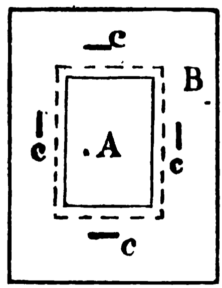
CARRIERS.

By Thos. W. Drinkwater, Ph.D., F.C.S., Lecturer in Chemistry, Ed. School of Medicine, V. P. of Ed. Photographic Society.

Photographers on tone are subjected to various troubles and many disasters; sometimes the focussing screen breaks, at others a tripod leg gives way, and we have seen a loosened leg calmly drop down a precipitous gorge into the tumbling ruin below as if it had grown disgusted with its mundane existence and determined to end its troubles in a watery grave. This sort of thing always happens when you are in the midst of beautiful scenery, pictures in every direction, and, what is more important, good weather. Of course there are a number of these troubles which are not enumerated in the above short list, and perhaps as annoying a circumstance as could happen is to be in an out-of-the-way highland district, away from coach routes and beaten tracks, in a locality where a railway train has been heard of but never seen, and I might add, nor likely to be; for there are some few spots like this still left, thank goodness. Well, there is not much hardship in all this, I hear some reader say; certainly not, but supposing you are now burdened with a whole plate camera, by some mistake a dealer has sent you half plates instead of whole ones, what is to be done? Well, you can send them back, and you can swear at the dealer. The first alternative is not always easy in the circumstances described, and the second, although it may relieve your feelings, is not likely to do the dealer much harm nor get you out of your difficulty. This was my position last Summer, hence this small item. I had read in

one of the almanacs about an ingenious amateur who had constructed cameras out of old cigar boxes ; alas ! I had no such luxury. It would, perhaps, have been as easy to procure plates as cigar boxes. The only artificer at hand was a blacksmith, a descendant of the poet's hero, clever enough at mending a ploughshare or making a harrow, but to make plate carriers—no. After pondering over the matter some time, and with the help of a little tobacco—I may here remark in parenthesis that a pipe of tobacco and a little calm reflection will do wonders in clearing away difficulties—I hit upon the following plan :

The "*clachan,*" for it could hardly be called a village, possessed one store where everything was sold except carriers, and from the buxom good-natured proprietress I procured a large square tin buscuit box. With the help of my friend, the smith, I soon had six pieces of tin plate cut, equal in size to a whole plate ; out of the centre of each, I cut a piece a little smaller than a half plate, so that the plate would rest in the opening, and we then punched four smaller holes so that it resembled the following diagram :



B, plate ; A, opening ; c c c c, four small punched holes. The dotted line indicates the size of the cardboard opening.

I next took the cardboard from some old plate boxes, which, of course, were equal in size to the tin plate, and cut an opening corresponding to A, but a little larger ; this we placed in contact with the tin and fastened through the punched holes with four paper fasteners, and my carriers, after a little dry blackleading, were complete. I made six in an hour, and used them to good advantage whilst the good weather lasted, and a better plate carrier I could not wish to possess. Perhaps some one consuming little more tobacco may improve on it, if so, let me know.

A NEW COLLODION.

By P. C. Duchochois.

In these times of hydroquinone and hydroxylamine developers, whose formulæ are already as numerous as the worlds rolling in the immensity of heavens, and every one the best, of course, I

cannot refrain from saying a good word for collodion, which seems to have been entirely forgotten to hail the new comer, gelatine, because of his American way of doing everything as quick as a wink, as says our witty friend, Rockwood. But it is not those who rush in their work who do it best; there is always some drawbacks by this manner of doing things, and

. . . . . *Sans en chercher la preuve,*
Dans Gelatine je la treuve.

I admit that collodion is slow in comparison with its rival, and capricious, too. One has to compound it according to certain results, to use it new to obtain plenty of details, old to produce contrasts and opacity. Then the sensitizing solution should be constantly watched to avoid pinholes, surface markings, *et le reste.* And it is precisely that which makes it interesting. We must know the pro and con, we must study our process and its chemistry. Now, one buys the plates ready for use, the developer, too, and the photographic operation is almost that of a machine. So much for collodion, and it is not all. If it is slow, it permits us to see what is going on. The image is visible from the commencement to the end of the development, allowing, therefore, of obtaining just the right intensity, to preserve the most delicate details, to obtain, in a word, the desired effects. All depends on our skill. Not so with gelatine; it forces us to work by a tiresome red light and blindfolded, the film being so opaque that not one, had he the hundred eyes of Argus, is capable to see the image as it gradually comes out, and thus to push or stop the development as is proper. We do it like that bird which for hours strikes a tree, and after each stroke turns around it to see whether it is bored through. Generally, the intensity has to be reduced or strengthened, and as this operation is based on chemical actions which take place instantly and consequently not under control, the result is often a picture without gradation. Maybe I exaggerate. Many operators know how to avoid these defects to a certain extent. Nevertheless, the advantages of gelatine reside solely in its extreme impressibility to the luminous influence, but when a comparatively long exposure is not a condition of success, collodion stands first.

The reader must wonder at this long digression before coming to the fact. My excuse is that I have a great predilection for the collodion process, which for nearly forty years has rendered me

such good services. I always remember my old friends; I always give them the precedence, and I know, reader, that you do likewise. Let collodion and gelatine go side by side; one can do what the other cannot.

Collodion, the object of this paper, is compounded with sodium lactate, which is soluble in a mixture of ether and alcohol at 90°. It does not admit the presence of metallic iodides and bromides being converted by double decomposition into an insoluble compound.*

This collodion keeps well, gives intensity and possesses a quality *sui generis*, that of producing warm and purplish tones when employed to make diapositives by contact printing on dry plates prepared by the bath process, and developed with silver nitrate and pyrogallol acidified with citric acid. It is for this special purpose that the writer has devised it. As preservative an infusion of coffee, not strong, is recommended.

The collodion is prepared by the following formulæ:

Alcohol, 90°	1 ounce.
Sodium lactate	4 minims.
Sodium iodide	8 grains.
Sodium bromide	2 "
Sodium chloride	2 "

Dissolve—add one ounce of ether; filter and dissolve twelve grains of pyroxiline.

PHOTOGRAPHIC JOTTINGS.

By A. E. Duckham, Cornell University.

The editors of the ANNUAL have kindly asked me to contribute an article for the issue of 1889. But the question arose before me, "about what shall I write?" Doubtless the various heads of photography will be discussed by more able writers than myself, those who have devoted their entire time and energy to the advancement of this branch of science, which is making at the present day at least as rapid strides as any other.

So I will simply throw out a few hints gleaned from my own experience. I think that all practical photographers will agree with me that one of the first steps necessary, before exposing a

*A confirmatory experiment should be made, for this chemical change occurred by using zinc bromide, which is seldom pure.

plate, is to consider the *artistic* qualities of the picture; for, if these are not satisfied, but little can be expected of the finished photograph, no matter how well the negative and print are executed *mechanically*. Say the subject is a landscape: a suitable foreground must be selected, containing some object as a tree, log or rock, to lend the proper perspective, and to give depth to the view, which would otherwise be flat and insipid. Then the lights and shadows, with respect to both quantity and quality, must be studied; without the proper proportion of each the picture, though having plenty of detail, will lack contrast and brightness, which to the writer's mind is of paramount artistic importance. For landscapes, a clear day with bright sun undoubtedly gives the most beautiful and brilliant negatives, for groups and subjects where detail is desired principally a diffused light (a clear blue sky or light reflected from clouds) is desirable. And here a word or so may be necessary. Beware of taking groups under thinly foliaged trees when the sun is shining brightly. The author once took a negative of a friend who stood under a fruit tree whose leaves were rather scattered; being but new at the business at that time, he did not perceive that anything was wrong until he came to develope it, when to his horror he found the subject's face covered with spots. Having read (I believe it was in one of Dr. Vogel's books) that often a disease will show in the negative before it becomes apparent to the naked eye, he was considering the advisability of sending his friend to a physician; when, upon closer inspection and a study of existing circumstances, he found the cause of the trouble, sun spots (not on the *sun*, however), which had been created by the sun shining between the leaves of the tree. It is perhaps needless to say that that mistake was never made again. Another time I took a picture, which would have been a perfect "gem," but a *line full of clothes* (it was Monday), was in full sight! It was like the flaw in the diamond, but it could not be cut out. Probably it is useless to add that such incongruities as a "dude" and a rustic view will not fit.

To a certain extent there is a "rage" for long-distance views, but few good pictures are, however, obtained from these, as the foreground is apt to be under exposed, while the distance will appear hazy from over exposure. A short exposure with a slow plate (one or two seconds, in Summer, sensitometer 16, say), is generally more effective. The writer has made several long-

distance exposures in the neighborhood of Mauch Chunk, Penn., with a Dallmeyer lens, which produced negatives which were excellent in all respects, both in fore and background. And here I would express my opinion on the sensitiveness of plates. So many of our amateurs use *fast* plates for *all* purposes; this I consider a great mistake; for some landscapes, in dark places, portraits, interiors and instantaneous pictures, fast plates are absolutely necessary; but where a slow plate may be used, use it, as in ordinary land or seascape work. It possesses all the advantages of the wet plate for clear and brilliant negatives. If a mistake of half a second or a second is made in field work with a *slow* plate, it makes but little difference in the result; but such a mistake with a *fast* plate would result in the ruination of the picture. Then fast plates, being more sensitive, are more liable to fog, and cannot be examined so carefully in the dark room while developing.

Hydroquinone is probably the developer of the future, and I am much pleased with its action; but the "pyro," with carbonate of soda or potash as an accelerator, has been a good friend in the past. Ammonia-hydrate, for accelerating, is to be viewed with distrust, as it is generally the companion of "fog." After printing, comes the question of toning. To obtain good tones is probably one of the greatest difficulties to be encountered. In fact, we find many of our amateurs who leave this part of their work to the professional photographer. And here I would say to all amateurs, if you call yourself "photographer," do your own work; removing and replacing the cap of the lens is *not* photographing! There are so many *so-called* "amateur photographers" who get the professional to do all their *work*, and then get all the credit and praise for that work which does not belong to them. There are many different opinions as regards to the correct "tone;" some like sepia, some brown, some blue-black, and so on. But I would suggest, from an artistic point of view, that a dark brown be used for pictures depicting life and Summer, and a black for dreariness and Winter; a "warm" tone is always best in views with plenty of light and sunshine with foliage, while a cold tone is best for pictures showing snow and ice. Overtoning is a common fault which gives a gray photograph, and causes it to lose its brilliancy.

However, I must stop, for I feel sure that I have taken up more valuble room than I should, and perhaps rehashed some old ideas;

but, before I close, I desire to speak of an experiment I tried, which was entirely my own idea (though it may have been tried before, but without my knowledge, like many simultaneous discoveries in the scientific world). I wished to take a picture of my room with myself in it, and, no one being around to help me, I adopted the following expedient; after focussing and drawing the slide, I took off the cap of the lens, walked rapidly over to a seat, sat down with watch in hand, and at the expiration of one and a half minutes arose and quickly replaced the cap. Care must be taken that the operator does not sit in front of a light colored object, as a white door or chair. The reason is obvious. The time of exposures in interiors being so long, there is no danger of the movement across the room showing up "like a fleeting ghost!"

I hope that in these few remarks I have contributed at least the "widow's mite," and that the present ANNUAL will be a complete success, as was the one of last year, and that it may have long life and prosperity.

PHOTOGRAPHING FROM A RAILWAY TRAIN.

By P. H. Dudley, C. E., New York.

(Continued from Vol. I. of the ANNUAL.)

Several inquiries have been received in regard to further details of this important application of photography, especially since many of the views I have obtained have become more widely known. Most of the inquiries have related to the focal length of the lenses.

The reader is referred to Vol. I. for the general details of the method I used in photographing the Panama Railroad tracks, roadbed, building, and portions of the Panama Canal under construction, from a special train running ten miles per hour. In the New England States I have made many exposures at twenty miles per hour with fair results. Upon the Isthmus the light was very atinic and favorable for short exposures. I was able to do as well with *f*-16 as I expected to do with *f*-11, and the depth of focus was greater. Many excellent views were obtained with *f*-24. Speed of shutter, $\frac{1}{125}$ of a second; lens, 10x8; Dallmeyer, R. R., and same sized plate. As indicated in the previous paper, a lens of shorter focal length would permit an increase in the

speed of the train, which is a necessity on the busy railroads here, or the speed of the shutter must be increased.

In regard to the focal length of the lenses, the shorter they are the less the indistinctness of the foreground, requiring less inclination of the swing-back to correct it in part, while the depth of focus would be greater. Of course, details would not be so large. It was very important in my views on the Isthmus that details of the track and structures should be large enough to be of value in an engineering point of view without subsequent enlargement. It was thought by several that they would be too small, even when taken with a 10x8 lens of 13 inches focus. I tried a few experiments from a train with a 12x10 Dallmeyer R. R., 16-inch focus lens. The results were very unsatisfactory, as will be readily understood by referring to table No. 1 in the previous paper. The indistinctness of the foreground was too great, and when the swing-back was sufficiently inclined to partly correct it the track and building did not appear in their proper places. The shutter was made for the lens for nearly a full opening. The moving parts were correspondingly large and heavy, and it was not possible to move them rapidly enough for the speed of the train, so the views were not sharp and distinct. With the maximum spring power which could be applied to the large shutter its speed was only about $\frac{1}{75}$ of a second and fully $\frac{1}{150}$ was needed, which required four times the spring power of the first, and at that time could not be applied. Great improvements have since been made. The 13-inch focussed lens was the longest I could then use from the train, at about ten miles per hour, and obtain good results.

The past season, in passing over different railroads inspecting tracks with my car, I made several exposures at twenty miles per hour with my 10x8 lens, mounted as stated in the previous paper. The speed of the shutter was approximately $\frac{1}{25}$ of a second for *f*-16. The pictures were good, yet they lacked the sharpness of the negatives exposed upon the Isthmus. The shutter speed was slower in comparison with the moving train. The shutter speed was increased to $\frac{1}{15}$ of a second, which improved the sharpness, though the exposure was too short for the plates; only a faint image could be obtained, even when developed as indicated in the previous paper. A professional undertook to develop some of them with hydroquinone, and only obtained a trace of an image on one plate out of a box. The

developer was old and had been used to develop many other plates, and of course was unsuitable for this work.

I have recently tried a Gregg shutter for my 10x8 lens. The wings are very light, and the opening in them forms the diaphragm, which is diamond-shaped, and opens and closes upon the optical axis of the lens. The results are very promising. At eighteen miles per hour the picture is sharp, indicating at once that an increase of shutter speed will permit an increase of train speed. The shorter focussed lenses of 10, 8 and 6 inches can at once be utilized, with present shutters and plates, to meet the requirements for ordinary train speeds of 20, 25 and 30 miles respectively.

For the tourist, wishing only to take occasional views, a detective camera held in the hand would be all that was required.

Films, which are much lighter and less bulky, will be of great assistance in this work, and at once available for photo-mechanical printing—an important feature.

"WITH AN OBJECT IN VIEW."

By Harry T. Duffield.

When we start out upon a photographic excursion we are careful to see that our apparatus is in good order, that we have a plentiful supply of dry plates, and that we have "money in our purse," but one great essential to success we generally leave behind—a definite plan of action. We have inquired of some person acquainted with the part of the country we intend visiting, or read of it in a book and have learned that the scenery of this particular section is of such and such a character. Too often our informer is not a photographer, and can tell us very little that will be of actual benefit to us, and when we arrive at the photographic Africa, we have to undertake an exploring expedition for views.

The first steps we should take is to interview the oldest inhabitant, and learn from him the topography of his home region. He says, perhaps, that the river, we see from where we are, runs in such a direction ; that those mountains are so far off ; that beyond them is a level farming country ; that in the valleys between the mountains are many brooks, which run through thickly-grown woods. From his remarks we know we

will be able to obtain broad views from the mountain sides, cascades and glens in the valleys, meadows and farm scenes in the level country, and pretty pictures on the river's bank. From talks with the oldest inhabitants one finds that their ideas of beautiful scenery differ much from his, and the only use we can put the o. i. to is that of a sort of guide book.

On the morrow after the interview we start out for view-noting, leaving our photographic apparatus at home. With note-book and pencil in pocket we follow the river's course, and with the sun at our side we will go along this bank of the river. Here is a bit of rapids, we note it; there is a pretty cluster of willows, we note them; here is an eddy, there a bend—we note them all. So on we go until we reach the bridge, and then go down the other bank, and new scenes meet our view. The eddy looks better from this side than from the other, and is so entered in our book; the rapids look better from the other. But here is a charming view, and of it note is made. We turn our steps homeward, and on the following days we climb the mountains, go through the valleys, and walk over the roads of the farming portion, and carefully make memoranda of points of view, time of day when they will be in best sunlight, and so forth.

When our note-taking is finished we lay out our plan. On the first day we will photograph the river views; on the second, the broad views from the mountains; the third and fourth, the valley with its cascades and glens, and the fifth, the scenes about the farmhouses. We have with us four packages of dry plates, enabling us to make forty-eight exposures. We read over our memoranda; on the river we have noted twenty subjects; in the valleys, twenty-four; from the mountains, eight, and about the farms, twelve; in all sixty-four views; sixteen more than we have plates, so we must make a selection. As the valley is the most fertile in lovely subjects, we choose from that first, we take eighteen; the river next, sixteen; the mountains, to give contrast to the lowlands, eight; the farming region, eight. But as it is very probable we will make mistakes in exposure, we will at the first only expose for one-half of the selected views, and on the finest we will try two or more plates, giving different time; especially will we do this in the valley, for in the deep shade we are often deceived as to the strength of the light.

We look over our apparatus, check off every piece of it, and put it in its proper place, and then, as this is the first day, we start for our river tour. We expose eight plates, but we do not take that number of views, for we exposed three plates, giving different times, on the loveliest of them all—the eddy. That evening we develop our plates; three out of eight are good, those of the eddy are all failures, and we realize our wisdom in reserving eight plates. Back next day to the river; we have an idea what is the right time of exposure to give the eddy, and try two plates on it; we also make exposures on those views that were failures. On developing our five exposed plates, we find four are good. This leaves three extra plates. We pursue the same course with our valley views, exposing nine plates, of which seven turn out failures. We try again with the other nine, and four are failures. We then try our mountain views, and as broad views are the most difficult, we expose three plates on each of the two views we think will make the best pictures, and after-manipulations show us that we have succeeded in getting one good one of each. In the farming section we take six scenes, four of which prove to be satisfactory negatives. Now we have gone over our ground and we will count up satisfactory results: river views, seven; valley, seven; broad views, two; farm scenes, four—leaving us seven extra plates. Now the proportion of river and valley views to the others is fourteen to six and as river and valley scenes are chiefly characterized by water and heavy foliage, we will see if we cannot obtain more variety by taking other views from the mountains and about the farms, so we expose four of our extra plates, and succeed in making three good negatives. We remember three pretty views on the river and we take them, resulting in two good negatives. Of course, we are new beginners in photography, and next year we hope to do better. Our vacation ends; we return to the city; we meet our friend John who took up photography the same time we did. We have twenty-five fair negatives out of our forty-eight plates—too large an amount of failures, but when we see John's collection—about eight or ten fair negatives out of his forty-eight exposures, we are satisfied. John goes on the good old style of firing away at everything he sees, and says our plan is too much trouble to work. He is satisfied, and so are we. There are many ways of doing a thing, but only one correct way.

But the chief merit of our collection of views taken during our

vacation is variety; there are not too many pictures of a similar character; one does not follow in sequence another. This want of variety is the principal fault of the pictures taken by amateurs. If they are view-taking in a region of streams and woods, everything is of waterfalls, brooks and bits of woods. If near a lake, that body of water appears in each photograph. If on the seashore, nothing but sailing vessels, and all from one point of view. How seldom we see any figures in landscapes, nothing but trees and rocks. This absence of variety makes a collection of views by the amateur exceedingly monotonous, and any one who attends regularly lantern-slide exhibitions or exhibitions of prints will agree with us as to the correctness of this our assertion. It would be far better for the amateur to spend part of the time he gives to trying to make fine negatives to the reading of works on art in photography, for they will teach him how to make pictures and not solely photographs.

Next year we intend trying to illustrate some popular poem. We will have the verses of the poem printed separately on sheets of paper that will correspond in size with our bromide prints. We can use, if we wish, heavy plain paper, sensitized by the silver bath. Platinum prints also make beautiful illustrations, and any degree of thickness of paper can be used. The printing of the verses will cost very little, as also will the binding, and as we can have any number of copies of the verses stricken off, we will have several copies of the book to give as Christmas presents to our friends. We have not selected the poem we intend illustrating, but there are hundreds to select from, and we consider those descriptive of natural scenery—not too local in character—the best for our purpose. Of course, we cannot use a poem that is copyrighted without permission, but we think there would be no difficulty in obtaining such permission, as the book will not be placed on sale. Here is a poem which we think can be used by anyone; we have italicized those words which seem to us good subjects for pictures:

"THE SABBATH."

By Grahame.

How still the morning of the hallowed day!
Mute is the voice of rural labor, hushed
The plough-boy's whistle, and the *milk-maid's* song.

The *scythe lies glittering* in the dewy wreath
Of tedded grass, mingled with fading flowers,
That yestermorn *bloom'd waving in the breeze ;*
Sounds the most faint attract the ear,—the hum
Of early bee, the trickling of the dew,
The distant bleating, midway up the hill.
Calmness sits throned on *yon unmoving cloud.*
To him who wanders o'er the upland leas,
The blackbird's note comes mellower *from the dale ;*
And sweeter from the sky the gladsome lark
Warbles his heaven-tun'd song ; the *lulling brook*
Murmurs more gently down the *deep-worn glen ;*
While from *yon lowly roof*, whose circling smoke
O'ermounts the mist, is heard, at intervals,
The voice of Psalms, the simple song of praise.
With dove-like wings Peace o'er *yon village broods ;*
The dizzying *mill-wheel rests ;* the *anvil's din*
Hath ceas'd ; all, all around is quietness.
Less fearful on this day, the limping hare
Stops, and looks back, and stops, and looks on man,
Her deadliest foe. *The toil-worn horse*, set free,
Unheedful of the pasture, roams at large ;
And as his stiff *unwieldy bulk he rolls*,
His iron-arm'd hoofs gleam in the morning ray.

The keynote of this poem is quietness, and it is therefore well suited to our purpose, for we can make time exposures on nearly all the intended pictures. We will take first a picture of a landscape with a church in the distance, this will do for a frontispiece. Then plough-boy and the milk-maid wending their way to church ; next, the scythe in the grass, and if we wish a picture of field flowers waving in the breeze, a view of bee-hives suits the lines commencing, "Sounds most faint," etc. ; a flock of sheep, to suit the lines "The distant bleating ;" then a cloud picture ; a view of a dale to illustrate "The blackbird's note," and of a meadow for "And sweeter"—both of the views should show persons listening, but in different attitudes ; the lulling brook, the lowly roof, with circling smoke ; the village in peace, the mill wheel, the forge ; the scene with the hare we cannot have, and it is just as well to let it go, as we will have enough pictures without it ; then the farm horse, and if he will roll for us, we can take two pictures of him ; and last

of all, the village church with its surroundings. We have here subjects for sixteen pictures, all varied in character and often met with. The models, the plough-boy, milk-maid, etc., are easily to be had.

As we have said, poems suitable for illustrating can be found in the works of any of our poets, but judgment should be used in making selections. The one given above is applicable to any farming section in either England or this country, and the pictures will not be hard to get.

How much better it is to select two or three good poems for illustrating before we commence our photographic season than to take our views haphazard, simply because they are pretty ones. Illustrations appeal to the mind as well as to the eye; haphazard pictures simply to the eye. The result is worth far more than the trouble. There is nothing new in the idea of illustrating works by photography, for it has been often done, and is referred to here to bring it more generally to the attention of photographers, especially the amateur, as he has time to give such work, and there is no pecuniary loss if he fails in the attempt; besides the artistic side of the undertaking, he has an object in view to work for.

HALF A CENTURY OF PHOTOGRAPHY.

By the English Editor.

"Better fifty years of Europe
Than a cycle of Cathay."

—*Tennyson.*

Age after age the tree of science grew slowly and even painfully. The seed was sown by the early Egyptian and Grecian astronomers; it was nourished by Arabian mathematicians; and the European alchemist worked steadfastly, though in the twilight, to further its growth. And then, in the nineteenth century, the work of all the ages brought about fruition; and we "the favored of all time" sit under its shade and gather its fruit.

During the first quarter of the present century both Davy and the younger Herschel had the keys of photography in their hands, but they knew it not. In France, the elder Niepcé obtained results as early as 1816; but the imperfections of his

"heliographic" process caused him continually to put off its publication, and he died—a disappointed man—in 1833.

During the year 1838 vague rumors reached England that a French scene painter, Daguerre, had succeeded in fixing the pictures of the camera obscura. Scientific periodicals were then very rare in this country; indeed, the *Athenæum* was the only weekly which took special cognizance of the announced discovery, and that rather for its bearings upon art than upon science. In this journal for 26th Jan., 1839, a letter from Paris (dated Jan. 16) describes "the universal interest excited here by the paper read by M. Arago before the *Academie des Sciences*, at their session of the 7th of Jan." This had led the writer to call on M. Daguerre, and he continues as follows: "The long researches made by Mr. Daguerre to produce the wonderful effects of light and shadow which he exhibits in his dioramas have ended in his present invention. Briefly to explain it: it enables him to combine with the camera obscura an engraving power—that is, by an apparatus, at once to receive a reflection of the scene without, and to fix its forms and scenes indelibly on metal in *chiarocuro*—the rays of the sun standing in the stead of *burin*, or, rather, of acid—for the copies thus produced nearly resemble aquatinta engravings exquisitely toned. . . . The earlier sketches or rather *reflections* which M. Daguerre made some four years since, have a slight haziness; this defect he has now entirely overcome. Some of his last works have the force of Rembrandt's etchings. He has taken them in all weathers. I may say at all hours—for he showed me a sketch of Notre Dame made in a pouring rain (the time occupied in the process being lengthened under such unfavorable circumstances) and a sketch produced by the moon's light, which required twenty minutes for its completion."

Moving objects troubled the worker then as now, for "in one of the views a horse is faithfully given, save the head which he never ceased moving."

Daguerre might almost claim the credit of the detective camera, for he told his interviewer that "the machine is so little cumberous that he has stood upon the bridges to use it, and been hardly noticed by the passers by."

We all know now, that the daguerreotype picture was the result of the action of light upon a metal plate coated with iodide of silver, the picture being developed by the vapor of

mercury. At first Daguerre used a strong solution of common salt as a fixing or clearing agent, but he soon abandoned this for the hyposulphite of soda, recommended by Herschel. The process was much improved, and was worked successfully (especially in the United States) until 1860 or thereabouts. Its chief defect was that the metal plates being of course opaque—the pictures could not be multiplied by copying through.

The announcement of Daguerre's discovery probably hastened the publication of a process called "Photogenic drawing," the invention of Henry Fox Talbot. In the *Athenæum* for 2d Feb., 1839, a meeting of the Royal Society which took place on Jan. 31 is reported, Talbot's paper being the principal buiness of the evening. The report states that Talbot "has found it possible, by a subsequent process, so to fix the images or shadows formed by solar rays, that they become insensible to light, and consequently admit of being preserved during any length of time. He has also succeeded in discovering a method of preparing the paper which renders it much more sensitive to light than any which had been used previously, and by means of which he finds that there is no difficulty in fixing the pictures given by the camera obscura. He states that in the summer of 1835 he made a great number of portraits of a house in this country, of ancient architecture, several of which he exhibited to the Society."

In the first process of Talbot's he used chloride and nitrate of silver spread upon paper, and the exposure in the camera *was continued until the image was complete and visible.* Talbot did not learn a method of *development* (which was effected by a solution of gallo-nitrate of silver) until more than a year later, and he then also substituted iodide of silver for the chloride which he had first employed. He patented this (under the name of the *calotype* process) on 8th Feb., 1841, and this was the third British patent for photography, the two previous ones having been granted to Daguerre and to his English licensee, Richard Beard. The calotype process was further improved, and was largely used—though mainly by amateurs—until about 1856. The great advantage of the calotype (or Talbotype as if was more frequently called in America) was that the image first developed being a negative, *i. e.*, having all the lights and shades reversed, and being moreover upon a translucent substance like paper, any number of *positive* copies could

be obtained from it by placing a second piece of sensitive paper underneath it and exposing it to sunlight.

But in 1851 the London sculptor, Frederick Scott Archer discovered that a skin of moist *collodion* upon glass was a much better surface than either a plate of silver or a sheet of paper to be impregnated with the sensitive silver salt (the iodide) then employed. The collodion process was that almost universally employed in photography up to 1880.

In 1856 D. Hill Norris, of Birmingham, introduced collodion dry plates. In 1864 Messrs. Sayce and Balton (of Liverpool) showed that collodion could be impregnated with bromide of silver (thus forming an emulsion) which might then be poured on glass plates and dried. In 1871 D. R. L. Maddox pointed out that *gelatine* might be used to form the emulsion instead of collodion. The "final touch" was given by Mr. Charles Bennett, in 1878, when he showed that by "stewing" or boiling an emulsion of gelatine with bromide of silver previous to coating glass plates with it, a surface most exquisitely sensitive to light was obtained. Such plates are now all but universally employed in photography, and millions of them are manufactured annually.

To follow the thousand ramifications of the "light science" would be all but impossible. The numerous "photo-mechanical" printing processes in use are based on the discovery announced by Mungo Ponton of Edinburgh, in 1839, that potassium bichromate was sensitive to light; and to the further discovery by Fox Talbot in 1852 that a mixture of this salt with gelatine was rendered insoluble by light.

To name the various other directions in which photography is rendering the most powerful aid would be to enumerate not only all the arts and sciences, but almost every feature of our everyday life.

Singularly enough, the three greatest scientific discoveries of the nineteenth (or any other) century were announced almost simultaneously.

Electric telegraph, 1837.

Railroads.

Photography, 1839.

And ever since the three have run a steady race in their endeavors to be of service to mankind.

In the census of the British Isles for 1841 photography is not even mentioned as an occupation; the census of 1851 reckons

only "fifty-one photographers, including one female." What the present number may be, we should not like to guess, but it is certainly to be reckoned by thousands. And we confidently look forward to the time when every educated individual will—for some purpose or other, as a recreation, business, or aid—practice photography.

RATE OF OXIDATION OF SODIUM SULPHITE SOLUTIONS.

By Arthur H. Elliott, Ph. D.

The use of sodium sulphite for the preservation of organic developers is now so prevalent that it appeared to me to be important that some experiments were necessary in order to ascertain how rapidly its solutions oxidize. For the preservation of the organic developers depends upon the deoxidizing power of the sodium sulphite.

In order to obtain a series of solutions that were useful as preservative of organic developers and of gradually less strength, a saturated solution of crystallized sodium sulphite was taken and reduced with water, so that weaker solutions were obtained, containing 80, 50, 25 and 12½ per cent. of the volume of the saturated solution. Thus, to obtain a solution 50 per cent, saturated, 50 volumes of the saturated sulphite solution was diluted to 100 volumes with water. This is not the same as adding 50 volumes of saturated solution to 50 volumes of water, as by this operation a shrinkage occurs and we do not get 100 volumes. Each of the solutions used, therefore, contain 80, 50, 25, and 12½ volumes of the saturated solution *in* 100 volumes.

Having made up this series of solutions, and also being aware of the fact that they all contained a small percentage of sodium *sulphate,* I at once determined the quantity of the latter salt in each solution, and on the same date. This is preferable to ascertaining the amount of sodium sulphite in solution, since the well known iodine method by the use of starch paste was proved to be utterly unreliable, with all the precautions advocated by Bunsen and other chemists. In fact, I never realized before the entire worthlessness of the iodine process for sulphurous acid until I undertook to ascertain the strength of solutions of sodium sulphite by the use of it.

Therefore, as sodium sulphite cannot be kept free from sulphate, no matter how pure it is made, the best crystallized

sulphite obtainable was used to make the solutions, and the amount of sulphate in them was determined by first boiling off the excess of sulphurous acid with excess of hydrochloric acid, and then precipitating the sulphuric acid as barium sulphate in the usual way.

The solutions gave the following amounts of sodium sulphate ($Na_2 SO_4$) in 100 volumes (or grms. in 100 c. c.).

80% = 1.64; 50% = 1.28; 25% = .84; 12½ = .82.

Five days after these solutions were examined again (being agitated several times each day), and were found to contain:

80% = 1.73; 50% = 1.72; 25% = 1.96; 12½ = 2.75, parts of sodium sulphate in 100 volumes.

Another series of tests were now made to ascertain the total amount of sodium sulphite in the original solutions, in order to obtain an idea of the rate of oxidation upon the total sulphite. For this purpose the solutions were oxidized with bromine to convert all the sulphite into sulphate, and the latter was precipitated as barium sulphate in the usual manner. In these experiments it was found that the solutions contained the following amounts of sodium sulphite ($Na_2 SO_3$).

80% = 15.4; 50% = 9.47; 25% = 4.14; 12½ = 1.39.

Calculating the oxidation figures to 100 parts of sulphite in the original solutions we obtain the following numbers:

80% = 0.51; 50% = 4.08; 25% = 23.80. Which mean that of 100 parts of sulphite in the original solutions, the above amounts had disappeared in five days, the 12½% solution having become completely oxidized in that time. It also appears that the weak solutions oxidize very much more readily than the strong ones, as might be expected. A five per cent. solution will completely oxidize in forty-eight hours.

PRINTING.

By P. Ersly, Hillsboro, Texas.

In writing for the ANNUAL, I will take for my subject photographic printing, as I believe less attention is given to this part of the work than any other. It will readily be admitted that a thoroughly accomplished printer may produce very fair prints from poor negatives, while one less accomplished will often produce poor prints from good negatives. I am writing for the benefit

of this latter class and give my way of working. My formulas are all of the plain and simple kind to be found in all our text books. Yet in practice circumstances often require a little deviation from any general rule. Herein lies the secret of success. I always keep my paper in a dry place. When I come to silver if it is too dry I put it in a damp place for a few minutes only (which I seldom do). If too dry it soon curls up after floating, and when dry is harsh; fold it and it breaks easily, while, if too damp, it appears limp and dries slowly. Right here let me say paper must be thoroughly dried before fuming. Also, if too damp when floated it seems damp after fuming, prints red and acts badly in toning and fixing. In regard to time of silvering I silver from 2½ to 3 minutes; but here again I find some paper requires more silvering than other. Paper undersilvered will show reddish spots on it when printed; let the light strike the back of the paper it soon looks very spotted. While, if oversilvered, there will be spots similar to the undertimed, but smaller and darker. To an experienced hand both are easily detected. Again, paper undersilvered tones faster and bleaches more in toning, and also in fixing than when silvered more. After silvering I keep my paper in a dry place till ready to tone. I can keep it well for a week, though it may tone a trifle slower.

In the matter of toning, if prints refuse to tone or act badly, I invariably look for the fault in the silver bath. If they turn red or red spots come on them and they do not tone, I find too much silver or silver bath too acid is the cause. Go slow, stop, think and examine. In fixing I use 2 oz. hypo to 20 water, and here let me say I protest against a too strong fixing bath. I am governed by the appearance of the prints. When in the fixing bath in five minutes they show how they are progressing, I watch closely, keep them in gentle motion, if fixing too fast add water to have them look fixed in ten minutes. Then add ¼ water to the fixing, letting them remain five minutes longer and they are all right. I never have blisters unless I use too strong a fixing bath. My silver bath never sees daylight, is always clear and ready for use. I never have to doctor it except occasionally to put in a little ammonia; and after standing awhile put acid in to bring it where I want it. Then I keep a little kaolin in my stock bottle. But my idea is, the successful printer is he who loves the work, studies it thoroughly, observes closely all the changes in each operation and learns from practical work to etect and master the little annoyances.

LANTERN SLIDES.

By Fred. H. Evans.

The inquiry is frequently seen in the photographic papers as to the manner of getting warm tones in lantern slides; and the plan generally advised is to "over expose and dilute the developer." This not only seems to me to be absurd in principle but has always failed in my hands, for if a warmer tone has been obtained, it has been at the expense of anything like a satisfactory all-over representation of the negative. If the principle be a correct one, all difficulty in making good lantern slides is surely at an end, for one has but to give random exposures—any time so it be long enough—sufficiently dilute the developer, and presto! a good slide! Personally I find it a matter of some difficulty to so gauge the exposure as to get the best possible result, and though always working at the same distance from the same illuminant—a No. 5 Bray gas burner full on—it often means using three or four plates to repeat any previous success. But why should not the rule for negatives hold good for lantern slides, viz., for a perfect negative the exposure must also be perfect? The latitude with slow thickly coated plates in negative work is doubtless very considerable, though even then there is one perfect exposure and all others are but approximate. In lantern work (I speak exclusively of contact printing on commercial plates) there seems to me to be far less latitude; it is my experience that there is but one corect, *i. e.*, best exposure, and if that is exceeded, or *vice versa*, some portion of the picture is sure to suffer. If I want warm tones, I get them by changing the developer, not changing the exposure; *i. e.*, pyro with or without carb. amm. or still warmer tones, *i. e.*, browner not redder, dry pyro, mixed with its preservatives (to avoid stains) at time of using.

The difficulties in lantern work are, to secure all detail in the high lights, at the same time keeping the shadows transparent and without trace of flatness. Many negatives, especially interiors, have such an amount of contrast that to secure full detail from the densest parts without flattening the thinner portions is often a matter of difficulty. It can sometimes be overcome by covering the back of the negative with tissue or tracing paper and pencil-working on that to get even printing all over. This I have found so difficult to do without showing the working in the

positive that I have given it up for almost all cases, and trust to giving the correct exposure to get the best all-round effect. If working on the back of the negative is resorted to, I would suggest covering the front of the printing frame with tracing paper; this will soften the outlines of the "dodging," and by diffusing the light before reaching the negative, will go far to make such working on the back a success. I always work with my printing frame so covered (using tracing linen to stand wear better), as I find another advantage from its use: it will often have been noticed when printing from a negative in which there exists very great contrast in some one part (say a tree in the foreground with very little detail), that in the positive, will be seen a white line, suggesting the criticism that "dodging" had been resorted to to make the tree print well, but so badly as to show its outline very plainly. This can be avoided in a large measure by diffusing the light through one or more thicknesses of tracing or tissue paper on the front of the printing frame, of course increasing the exposure proportionately. The distance the tissue is thus from the negative prevents the grain showing in the positive which would result, were it placed in close contact with it.

Again, as regards warm tones: personally, I prefer the black given by ferrous oxalate or hydroquinone; photography as a graphic art is only comparable with etching or other monochrome work; therefore, it seems to me that a good engraving black is the ideal color to work for. Some workers are fond of showing extraordinary tones in pinks and reds, but surely such labor is thrown away; even the finest Bartolozzi red is useless for lantern screen purposes. The perfect color, to my thinking, is a velvety black, transparent even in the darkest shadows; to get this in perfection, calls for a negative perfect in gradation, or else a more perfect process than contact printing is at present. The great difficulty is to get all detail out without loss of crispness and without flattening the shadows, which are most likely over exposed.

For a long time I have clung to the theory that there is but one best exposure, and that any sound developer should develop it properly; but I have been forced to waver in it of late, different developers giving different results—apart from color merely—with same exposures; how far this may have arisen from the plates being of different speed, though of the same make, I cannot say. In the case of one interior, a part of which was dense,

but the detail of which was absolutely essential, the expense of flattening the other parts of the picture destroying all contrast and richness ; trying the same negative subsequently with hydroquinone I succeeded in getting the same detail, but without at all flattening the rest of the picture. With less difficult negatives I have no preference for hydroquinone over ferrous oxalate, and the color both give is equally fine ; but for any but that very scarce article, a perfect negative, I would advise hydroquinone. I used it as made up for negative work by Edwards & Son ; it is, I presume, much the same formula they give for their lantern plates. Pyro I like least of all, it seems to tend more than the others to that worst defect, opacity in the shadows ; the color it gives is often very useful for special subjects, but this depends as with all other developers on correctness of exposure. It seems to me to be unquestionable that any excess in exposure beyond the right (only to be found by experiment and comparing many versions from the same negative), though it may give a "warmer" tone, will inevitably be at the loss of richness and quality and contrast.

The majority of the workers with whom I have been able to compare notes are too liable to be content with the first result, do not try to better the best they have apparently obtained, and do not, therefore, realize the full beauties or difficulties of lantern slide making. Another dodge : I use 5 x 4 printing frame for contact printing from ¼ plate negatives and cover the glass bed with opaque paper having a central opening an ⅛ of an inch smaller than the lantern plate ; this secures a clear glass edge all round ; most negatives if printed from, without this rebate, will not yield a piece of really clear glass in their composition, and if the positive has not this somewhere, there is no test as to its requisite purity from fog or stain. I have tried nearly all the lantern plates in the market and find them pretty equal in quality ; the desideratum is to get them always of the same speed ; therefore, if any considerable quantity of negatives are on hand to print from, it is the safest to buy a large stock of the same batch ; this will ensure the greatest amount of uniformity possible.

A last word ; our lantern evenings would be considerably more interesting if amateurs would only try alternative exposures, *not* be content with the first result, *not* be afraid of full exposure ; we should then have a little less of that common phenomenon,

roads covered with snow (apparently) in full summer and blazing sunshine! It is luck, not judgment, if a perfect slide is got at the first exposure; the judgment comes in when we try how much better than that first result we can get by experimenting with other exposures; even if half a dozen plates are used before a perfect slide is got, it is surely very cheap at the sixpence it has thus cost! So, let the motto in lantern slide making be the good old one, "try, try, try again."

A TANK.

By A. R. F. Evershed.

Recently, having to photograph a number of specimens preserved in spirit, in glass jars of various shapes, some being round, others oval, a difficulty presented itself—how to avoid the numerous reflections from the fronts and sides of the jars, which in the photographs quite marred the appearance of the specimens. Many attempts were made to overcome these reflections, and expedients tried, but none were thoroughly successful; and as the jars were sealed it was obviously impossible to remove the specimens.

At last I had a tank constructed with slate back, sides and bottom, and plate-glass front; the jar containing the specimen was placed in this tank, as close to the front as possible, and the tank filled with water; by this means all the reflections were got rid of and a perfect copy of the specimen obtained.

Though when viewing a specimen in the tank through the front, a reflection of the camera is seen, which, theoretically, should be reproduced in the negative; practically, if the camera is covered with velvet focussing cloth, it does not. I have found that a very full exposure must be given in order to secure the best results, and to obtain all the detail in the specimen. If the specimen is a very dark one, or if the various parts are in widely different planes, some help in the lighting may be had by using white tiles as reflectors placed against the inner surface of each side.

The tank I use for pathological specimens measures 18 inches in height by 9 inches in width, and the front is 12 inches in breadth; it has a tap let in close to the bottom of one side to let out the water; this tank is certainly rather heavy to move about;

but the weight would be much lessened if instead of slate, wood, rendered watertight, and stained or painted with some dull-surfaced, dark-colored pigment, was used, this would be necessary for tanks of larger sizes.

This method will be found exceedingly useful by curators of museums and others who wish to obtain accurate reproduction of the specimens in their care; and I fancy it is also suitable for photographing articles, such as silver-plate, etc., with many reflecting surfaces.

I have also used the tank for photographing either fresh or preserved specimens which are not in jurs, and which have many reflecting points, or which when not in fluid, collapse and lose all their characteristics, and by this means have obtained more satisfactory results than by any other method.

SYSTEMATIC EXPOSURE FOR ENLARGING.

By E. Ferrero.

In determining the length of exposure to be given in enlarging, four factors have to be considered:

The amount of light received upon the plate, represented by the intensity ratio, viz.: the distance from the lens to the focusing screen divided by the diameter of the stop used.

The actinic power of the light illuminating the negative.

The sensitiveness of the plate or paper on which the enlargement is made.

The density of the negative.

The table (see "Tables" end of volume), shows the correct exposures according to the three first points with a clear and rather thin negative, just dense enough to give a good silver print. The operator will have to vary the exposures according to the density of his negatives, but the experience acquired in printing by contact will be a pretty safe guide.

Having focussed the image on the screen, the exact distance from the stop of the lens to the screen is measured and divided by the diameter of the stop. To simplify matters, a stop measuring 1 in. or ½ in. may be used. The actinic power of the light should then be tested by means of an actinometer. Stanley's is a good one, and the table is made for this instrument.

Let us suppose that the distance between lens and screen is

found to be 30 in.; using a ½ in. stop, the lens will be working at f. 60. We now place the actinometer close to the negative, and count the seconds required to register the standard tint.

We will suppose that the time has been 25 seconds. We find this figure in the first column of the table, and following the line indicated we find, under the column headed f. 60, that the exposure is 5 minutes 17 seconds.

This will be correct for Eastman's and Ilford slow bromide paper. For Ilford rapid bromide paper 1-50th of the exposure should be given, and for "ordinary" gelatino-bromide plates registering about 18 on Warnerke's sensitometer, 1-15th to 1-20th will be found correct, whilst Mawson & Swan's Lantern plates require three times the exposures given.

The stop, on which the calculation has been based, need not actually be used, but, knowing the correct exposure required with it, we can use any other stop, and after the exposure in the same proportion as we would when substituting one stop for the other in taking photographs in the ordinary way.

The table can be used also for enlarging by artificial light, the power of which can be measured once for all with the actinometer, and for making reduced transparencies, as the same rules apply.

ON THE FINDER AND ITS ADJUSTMENT.

By John Harmer.

If one took the cue from a dealer's stock or list, it might be concluded that the only thing necessary to the proper employment of a finder, was to purchase one and stick it in almost any position on the camera to immediately reap the full benefit of its valuable aid, instead of which its correct adjustment to insure its field of view being always in accurate register with that included on the focussing screen, is a somewhat tedious operation, requiring thought and consideration.

If pictures are to be made and the utmost got out of the lens in use, the vertical and lateral motions of the camera front must not be idle; therefore fastening the finder to the body of the camera will only mislead, as the register will be upset at every alteration in the position of the lens. Under these circumstances the finder in conjunction with a sliding back-sight should be mounted on a slip of brass, bent to a right angle to be carried

over and fastened to that part of the camera front which carries the lens by means of a thumb-screw, or if the whole contrivance were specially made, it might be constructed to fold with and form a fixed portion of the camera. The kind of finder having been determined (I prefer the double concave lens, my most effective ones consisting of the bottoms of small cut tumblers) and mounted upon the slip of brass as suggested, take and set up the camera out of doors and proceed to adjust till the view shown in the finder tallies exactly with that seen on the screen. No pains should be spared to ensure accuracy, as when it is once done all trouble and anxiety connected with it are at an end, and as it is fixed to the lens carrying front of the camera it partakes of any motion imparted to the lens, and always gives an accurate view of what the sensitive plate will receive. The motion of the lens being unrestricted, its axis can always be brought opposite to that part of the plate at which the principal object is desired to appear without the qualms arising, from the knowledge that the finder has been rendered practically worthless by being thrown out of register, to distract the photographer or limit his artistic flights.

MY BABY.

By Martin I. Harding.

Oh! could I but keep him as he is! How frequently do we hear some such wish expressed by a fond mother whose darling has reached some particularly interesting age. Now the peculiarity of my baby is that no such wish need ever be uttered, there not being the least fear of its developing into a gigantic 15 x 12, or ever exceeding the limits of cameraic tottledom. *My* baby never cries; its bellows are but of short extent, which may be estimated from the little fellow's outside measurement, 4 x 4 x 1½ inches when closed. This tiny camera, made in polished ebonite, takes lantern size plates, has rack focusing adjustment, swing back and ground glass screen and, while being primarily intended for hand work, has the immense advantage over most forms of so-called "detectives" that it is available for ordinary field work on a tripod. The shutter is of the revolving disk form, with spiral spring motive and works behind the lens. For use in the hand the focusing screen, instead of folding over, slides right out, being replaced in the usual way with

roller or double dark slide, and with lens at full aperture—*f* 6—a fixed focus marked on the tail board gives everything beyond twelve feet perfectly sharp. Whilst admitting certain advantages in a roller slide, I confess to a lingering love for the old book form. With six of these and a packet of extra plates wrapped in a small home-made changing bag—the whole lot with the camera and lens in a compact satchel weighing no more than an ordinary field glass—I feel fully prepared for all that may be met with in a day's march, and have the satisfaction of knowing that the resulting negatives will be free from grain and the various inherent defects of paper and other films.

It may at first sight be thought that only the most insignificant results could be expected with such a diminutive apparatus, but it will be my object to show that, while being of all sizes the most convenient for lantern-slide work, this apparent toy may be the means of producing large pictures of the highest class.

For the saving of mere labor in the field my "Baby" is without a rival. Who is there working only a whole-plate camera, even of the very lightest pattern, that has not, on some blazing hot day, felt himself to be a veritable Atlas? Excepting the occasions (for most of us—none too numerous) when photography is the main object in view, the large camera is, of necessity, left at home. How frequently, when out for a country ramble, has its absence been keenly felt. What golden opportunities for catching some striking group of cattle, or sheep, or village children have been irretrievably lost. How often has some exquisite cloud-effect raised ardent longings for the means of securing a permanent impression of its fast vanishing beauties. With a "Baby" in one pocket, a couple of slides in another and a light, yet rigid walking-stick tripod, there need to be no tantalizing regrets for lost opportunities, and without any special effort a great additional zest will be imparted to the ordinary evening stroll.

On the ground of economy in working, this miniature camera cannot be beaten, the outlay for plates, trays and other requisites being reduced to a minimum, and in comparison with large sizes, the difference in expenditure for plates alone will be strikingly apparent.

It only remains to show what "positive" advantages can be adduced in favor of the "Baby." For lantern slides it is of all

sizes the most convenient, simple contact only being required, whereas with any other size—even as small as quarter plate—part of the subject must be sacrificed, or the process of reduction be resorted to. But in commending the lantern size camera I have no intention of advocating the indiscriminate use of the entire plate for all subjects alike. The monotonous square and circular-shaped pictures are far too common at exhibitions. No reversal of the square back being required, the ground glass should be marked off with a double oblong $2\frac{5}{8}$ x 2 inches, which gives the usual vertical and horizontal landscape shape; if pencil lines are not considered sufficiently clear, a single oblong opening may be cut in strip of card made to fit neatly into the screen and easily reversible as desired. For hand work all the plate should be utilized and the subject marked off in the printing, according to taste. The addition of clouds is best made upon a separate plate to be used as the covering-glass. In dismissing this part of my subject, I would suggest to slide-makers a more extended use for their work. Except when brought out to put through the lantern, the slides are usually kept carefully stored away out of sight, a great source of pleasure being thereby lost. I would urge that they be kept convenient for inspection in the hand. When held before an opal globe their beauties will be fully appreciated by admiring friends who will often prefer these small transparencies before paper prints many times larger.

But perhaps the greatest pleasure and advantage in working this small size will be found in the readiness with which enlargement can be made from the "baby" negatives. No large and costly condensers are needed; neither are we confined to the ever-varying quality of daylight for the illuminant. Our only additional requisite is the familiar optical lantern with 4-inch condensers and 3-wick lamp, which will thus serve the double purpose of exhibiting our slides, and casting a negative image of any desired size upon our bromide or alpha paper. In the case of several prints of the same subject being required, an enlarged negative can be very readily made from the positive slide in the lantern. Of all methods of enlarging, I claim for this one the greatest simplicity and economy, and the results obtained should be in no respect inferior to pictures of the same size taken direct; indeed, the opinion is fast making way that a good enlargement possesses artistic qualities exceeding those of any

other photographic process. Its chief characteristic is a general softening down of that microscopic sharpness of definition so painfully prominent in large camera work. The beauties of this softened effect constitute a charm that is not in the least likely to be supplanted by the out of focus fuzziness of Emerson.

It would be easy to dilate upon the advantages to be derived from the possession of such an outfit as that described, but time and our good Editor's patience forbid. I will only add that could my "Baby" but speak it would join with me in wishing all the readers of "Anthony" an affectionate photographic "ta, ta."

THE COLOR OF A PHOTOGRAPHIC PRINT.

By J. H. Harvey, Melbourne, Australia, Secretary Photographic Association of Victoria.

It has often occurred to me that there is a mistake in the ideas of people who argue that pictures executed in one particular tint are more artistic than those which are portrayed in another tint. It has lately become the fashion among some persons to talk in very harsh words regarding the meretricious gloss and color of the silver print. They maintain that unless the color of a print is black that it is necessarily inartistic, for the simple reason that a steel engraving is, as a rule, printed in black ink. The person who lays down this argument is, of course so highly trained that he cannot see any artistic qualities in a drawing in sepia, nor even in an etching, which may be so unfortunate as to be executed in any other tint than what is known as "engraving black," a drawing in a neutral tint he abhors, and it is presumed that, following the same line of reasoning, a water color or a painting in oils would be a monstrosity.

But this is too ridiculous. What is it which gives value to any work of art? Is it the drawing, the composition—so far as lines and masses are concerned—the light and shade and the feeling, or is it the material or vehicle which is used to convey to others the impression which the original made upon the mind of the artist? Undoubtedly all right minded and practical people will agree that the material, together with the color of the same, is of very little importance, except so far as it agrees with individual taste; some persons cannot look upon a picture of a green

tint (such as is produced by one of the modifications of cyanotype) without feeling uncomfortable, but these persons do not object to any other tint. The writer knows others who have a similar dislike for warm sepia tones, but were the subject rendered in black, blue, purple, or any other tint, they could thoroughly enjoy it.

Then why should a section of the public hail with delight the advent of the black tones of the platinotype, and develop prints on paper prepared with gelatino-bromide of silver, and persistently advocate the printing of all subjects from all negatives by one of those processes which will give black tones? It has been said that these are preferred because they are more artistic than the albumenized paper print, being more like an engraving. According to this idea one would think that unless a photograph is like an engraving it cannot be artistic. With regard to color, how came engravings to be considered artistic? Presumably because they somewhat resembled etchings. Then why should an etching be necessarily artistic? Here we stop; for the first work of this kind there was no precedent, and therefore it is to be supposed that this early work is entitled to be considered art, not for the reason that it was similar to something which had preceded it, but simply because it was executed by artists who put the whole power of their cultivated minds into the subjects which they traced on the copper plate.

This should prove conclusively that there is nothing in the process by which these results are produced to render them artistic, neither does it depend upon the color in which they are printed. An etching by any good master, printed in blue, green, brown, purple, or any other tint, would still remain the same work of art that it is when printed in black; as a matter of fact, many etchings are printed in ink other than black. (I do not intend to enter into the broad question as to whether photography should be considered *art.*)

There is no reason why photographers should strive to make their work look like steel engraving; surely a photograph can stand on its own legs. The ordinary silver print possesses a wealth of detail, a truth to nature's forms, a variety of tones, a beauty of color and an individuality of character, which is peculiarly its own, and which no engraving can equal, and any treatment which strives to make it appear like, or to ape a steel engraving, an Indian ink drawing, or, in short, to make it seem

anything but a photograph, is nothing more or less than fraud,—an attempt to obtain certain results by false pretences, which carries with it all the hollowness that characterizes deception, and which will surely and speedily burst to the discomfiture of its perpetrator. Anyway, this "toadying" to the tastes and ideas of a small section of people who hate photography and everything photographic (many of them do so simply because it exposes their own shortcomings as regards drawing, and genuine artists are, I am convinced, not among them), and let us print from our negatives by any process which we think will best suit the nature of the subject, and which will give an effect most nearly approaching that which the original in nature produced on our own minds. Let the process be chloride of silver, platinotype, bromide of silver, or any other, as each negative and subject may specially require; but we cannot be expected to progress while we tie ourselves down to one particular tint for the reproduction of our photograph, and wed ourselves to this for no other reason than that a few persons who have elected themselves a committee of taste in these matters, publish as *their opinion*, that the only artistic results which the world sees, are those which are produced in "black and white."

NEW POINTS ABOUT HYDROQUINONE, AND PREVENTING BLISTERS.

By Captain Eugene Himly, of Berlin.

Nearly every photographic journal brings some news and formulas for developing with hydroquinone, and still the literature about this is not exhausted. As the use of this chemical in the art of photography is comparatively new, everybody is anxious to experiment with it; but now and then the results are not even, and if at the same time under the same conditions with other developers trials are made, these appear to be better. Especially is this the case in developing bromide of silver emulsion paper; it happens often that by use of hydroquinone developers the whites look yellowish, whereas by oxalate of iron developer they are perfectly white. In consequence of this many amateurs experiment to overcome this difficulty, but until now without success. Recently I have tried with good success the

addition of ferrocyanide of potassium to the hydroquinone developer, and have found that by using this the addition of bromide of potassium can be left out. Ferrocyanide of potassium has been already used before in developing, by Newton and others, with success. Their formula is known to all; it has been also proved to act as an accelerator in pyro developers. The use of ferrocyanide of potassium can be advised if more high lights are wanted and more contrast in the picture. Compared to bromide of potassium, which gives hardness and keeps the development back, the ferrocyanide gives better high lights, accelerates the development and also holds the plate clear. The experiments did show that 10% of it added to the different hydroquinone developers produce the effect that the high lights appear suddenly and the negatives are finished in about one to two minutes shorter time than all the usual developments, but the high lights are too hard. Therefore I advise to use the following: First, a solution of 50 grams of ferrocyanide of potassium in 100 water is made and this solution is dropped into the developer instead of bromide of potassium solution. The results are decidedly better than with the use of the bromide. The color of the negative is darker, the whole negative has more contrast, so that I can recommend this method for trial; the more so as it can be used with soda or potash, caustic soda and caustic potash hydroquinone developers in all the different recipes. However, I have to call attention to the fact that the developing solution gets brown within an hour and that it is not advisable to develop more than four negatives after each other in the same bath. After an hour the developer has become very dark and it developes too slow to be of further use.

The addition of ferrocyanide of potassium is also advised when reproductions of line drawings are to be made. Up to this time the oxalate of iron developer was alone in use for reproduction, inasmuch as it gave the densest negative and clearest shadow. However, it is always necessary to intensify these negatives very much, and during this operation the clear shadows suffer and become a little colored. This is not so much the case with this hydroquinone developer with the addition of ferrocyanide of potassium, as the negatives produced by this are to be developed through and need hardly any intensification. It is advisable to put the plate, after it has passed the fixing bath, into

an alum or chrome alum bath, then wash well and proceed, when required, with intensification.

A NEW APPARATUS FOR SECURING THE EDGES OF NEGATIVES AGAINST BLISTERS.

Nearly a year ago a well known amateur, Mr. White, showed an apparatus for securing the edges of negatives against blisters. Mr. White used a postage stamp damper; consisting of a hollow glass handle which had on the top a rectangular opening. This handle was filled with a solution of common caoutchouc in benzene. In the rectangular receptacle there was flannel pressed in, so that whenever the handle was turned down the caoutchouc solution soaked into the flannel pad and then this apparatus was passed around the edges of the negative rubbing the pad on the film edge all around. Thus the caoutchouc solution would form a thin layer of caoutchouc all around the edge of the plate, securing it against blisters and pealing off. Now it is a fact that benzene solution evaporates very soon, and as the apparatus is only closed by this flannel pad, it is apparent that the solution can not last long and has to be renewed very often. To prevent this and to be always ready for action, I take a metallic stopper, such as are now in use on perfume bottles. This stopper is of tin, has a top screw with two holes. Whenever this top is a little unscrewed the liquid can come out of the bottle by drops; whenever the same is screwed on tight none can come out. On this tin stopper top I solder a rectangular box of tin about an inch long, ¼ inch wide and ¼ inch high. One of the two long sides I make ½ inch high for the purpose of serving as a guide for leading the apparatus around the plate so that the preparation can soak on the plate only ¼ inch wide all round. I press into this little box flannel or felt. Whenever the apparatus is to be used the top screw on the box is loosened so that the caoutchouc solution can drop into the pad and soak this full, the stopper being fastened on a bottle with this solution and turned upside down. Then the rectangular box is pressed against the edges of the film side of the plate, so that the higher side of the little box passes all around the edge while the apparatus is passed around. It is best to hold the plate film side up by one corner in the left hand, and in the right hand the little bottle upside down; then the latter is pressed against the edges and passed all around the plate. By this manner a thin skin of caoutchouc

is formed around the plate, which secures it against blisters and peeling off. Whenever the apparatus is not in use the stopper top is screwed tight and no benzine can escape.

ON MAKING LANTERN SLIDES.

By John A. Hodges.

The popularity which the production of lantern slides has attained sufficiently justifies me, I think, in choosing the above title as the subject for a few observations.

Making a lantern slide, if by the term merely a transparency on glass is meant, is by no means a difficult matter; the merest tyro can perform the necessary operations, but the production of a really perfect lantern slide requires the exercise of no inconsiderable amount of skill upon the part of the operator. Apart from the question of artistic treatment and composition a lantern slide, to be successful as such, demands the possession of certain technical qualities. Probably in no other department of photography is good technical work more essential, and much of the indifferent work so frequently exhibited at societies' meetings on lantern nights is probably due to the fact that the producers of the slides are not themselves aware what the essential characteristics of a good slide are.

A slide to be perfect should possess every gradation from high light to deep shadow—very few slides exhibiting a preponderance of half tones, however pleasing to the eye, show well upon the screen. There must be a fair proportion of clear glass, and the slide when laid upon clean white paper should not exhibit the *slightest veil or discoloration;* the very faintest indication of such appearance should at once condemn it. While the shadows should be sufficiently strong to produce constrast, there should be no blocking by over development or other cause—directly transparence in the shadows is lost the slide should be destroyed. I believe the very general use of the mixed jet as a means of illuminating the slides for the purpose of projection is a very common cause of production of so many slides of the "soot and whitewash" *genus.* In my opinion, except for exceptionally large discs, it is far too powerful and penetrating, although, the light itself being small, the superior definition over other forms of light is certainly in its favor. For any picture up to sixteen

feet in diameter the blow through jet should give ample illumination. A good oil light I consider superior to the limelight for small discs up to eight feet for room exhibition *provided* the slides are really good. But a perfect oil lamp has yet to be invented; I believe we have by no means reached finality in this direction. There is another form of lime light not often used now, but which, with skilful manipulation, is capable of producing very good results. I refer to the dry-spirit jet. If an even flow of spirit to the jet could be ensured I believe the light would become very popular among amateurs.

I am rather digressing from my subject, perhaps, but lantern slides and lantern lights are closely related. I have been rather led to make the foregoing observations by having heard the excuse frequently made for the production of over developed dense slides: "Oh! I made them for a strong light, your light is not good enough." Now the fact is, and it is *the* test that a technically perfect slide will show well either with the oil or lime light, as I believe any unbiased critic will acknowledge.

In regard to processes—gelatino cloride and gelatino-bromide plates are now so readily procurable and are so easily manipulated that they will continue, probably, to find favor with the many, but I cannot help thinking that finer results are still to be obtained on collodion both wet and dry. Looking over this season's slides, and I have made several hundreds both collodion and gelatine, I find the finest among those who owe their existence to collodion. There is generally a something in the collodion slide which is wanting in the one produced by the newer process.

A great deal will, of course, depend upon the negative from which the slide is to be produced. The better the negative the better the slide other things being equal. If the negatives are taken specially with a view to the making of lantern slides the exposure should be full and the development slow, and excessive density avoided. Lastly, if the best results are to be obtained, the slides should be made by redaction and *not* by contact.

HOW TO TRIM PRINTS.

By Frank H. Howe.

Many methods of trimming and mounting prints have been published, but I have never known of the method used by

myself being adopted by others, although it is so simple and convenient that I doubt not it has suggested itself to others.

An artistic photographer will not confine himself to one or two regulation sizes in mounting prints, for no matter how skillful he is in composition, it is frequently the case that a picture is much improved by trimming off a part of the print before mounting. A complete supply of forms for trimming prints of all sizes is both an expense and a care. My prints vary in size from 3¼x4¼ to 8x10 and I never use forms in trimming.

Take a white 10x12 card mount and commencing in the middle, trace on it every size of card mount from 3¼x4¼ to 10x12 (be careful in tracing the lines that every angle is a perfect right angle). Mount this card in optical contact with a plate of smooth, clear glass (the traced side next to the glass), and then on the back and edges of the card apply two coats of common shellac varnish. This plate of glass with the cardboard under it and a knife and straight-edge comprises my trimming outfit.

The untrimmed print is laid on the glass and does not quite cover the traced lines for that sized mount; with these lines for a guide and the straight-edge to guide the knife or trimmer, cut first one side and then successively the three others. With this arrangement the print, to all intents and purposes lies on its card mount while being trimmed, so that the proper allowance can be made for margins and stretching of the print.

This plate is also useful to lay prints on when pasting for mounting, the shellac renders it impervious to water, so that it can be washed as often as desired, and the glass being cushioned by the cardboard under it, may be as thin as you please without any danger of breakage from pressure when trimming or squeezing the surplus water out of a wet print.

HYDROQUINONE

By J. Hubert.

Lately, the photographic enthusiast had a bad time of it. In search for novelty, his active brain re-echoed melancholy the old, old sound, until that overheated structure suddenly obtained a refreshing draft of hydroquinone. Not indeed before it was time,

for ammonia fumes and pyro-technical compounds threatened seriously to inflame the mind and constitution of the formulæ hunter and user alike.

The operator with extreme susceptibility to alkaline influences avowed that ammonia was ever ready to join compatriot spirits of the inner man, in their destructive attacks upon his poor liver, whilst the owner of an accidulated digesting chamber and the scientific formula, however, joined issue by condemning the volatile propensities of that useful but disagreeable agent of development.

A whole army of eager experimentalists, working by day and dreaming at night of honors and distinction, all mixed with quinol, kept photographic literature teeming with interest and expectation.

Can it surprise any one, then, that I caught the infection? I bought some hydroquinone and mixed it alternately with ammonia, soda and caustic potash, but, although I felt certain, I employed hydroquinone, of the image I obtained only the last syllable of that chemical, at all events, during the first half hour of the trial. I thought that would not do, and by way of making sure of what the real cause of my failure consisted, blamed everything in turn, but not finding it, obtained, as a last resort, a fresh supply of quinol from Hopkins & Williams, when lo, behold! that time I had the felicity of ushering into existence an image in less than ten minutes, which time I eventually reduced to flashing out a negative under the influence of high temperature by using caustic potash. When thus I became aware of the practicability of using the new comer, I adjusted the proportions so as to be able to develope in a reasonably short time, about three minutes.

I then experimentally compared various formulas, pyro-ammonia, pyro-soda, quinol ammonia, quinol soda and quinol potash; but although by dint of great care I was able to develope a good negative therewith, pyro-ammonia remained my first favorite, pyro-soda second, whilst I have reserved the remaining stock of quinol for all manner of copying and transparency work, for which I believe it to be exceedingly well adapted. The range of half tone in portrait work being, in my opinion, inferior.

For some time past it has been my practice to take two identical negatives of sitters, the pyro developed negative of

which showed a wide range of half tone in every case; whilst the other, treated with quinol, presented a deficiency in that respect, though the quinol employed was admixed with various alkalies and proportions during repeated trials.

With regard to the blue-black image which quinol gives, I found that dry plate negatives with a color of a decided wet plate character, do not necessarily give the most desirable negative, but recognizing the importance of printing quickly, I invariably use sulphite of soda, the addition of which secures an entire absence from stain, if passed through an alum bath, the use or omission of which I turn to account by perfecting the printing density. Pyro and soda, kept from rapid oxidation by sulphite of soda, will give a negative of beautiful black color and quick printing quality with the clearest shadows, and a good range of half tone (slightly inferior to ammonia, however). To summarize then, it seems to me that there is no virtue in hydroquinone that is not present in our familiar pyro, whilst the objections to its employment are: slowness, when used in conjunction with its most suitable alkali; a higher price (for using solutions over and over again, is troublesome and scarcely scientific), and less range of semitone, a deficiency which will prevent it from coming into general use if my estimate should prove the correct one.

LEIMTYPY.

By J. Husnik, Prague.

For two years leimtypy has been worked in Bohemia and other countries after Husnik's patent, and enjoys a daily increasing application. The glue plates, although durable in the proofs, are not so lasting for a longer time, on account of the continual drying and shrinking of the glue and the consequential loosening from its support or bursting. For this reason, if after four to six months or later the plate is required again for printing, an electrotype should be made beforehand. The expense for this being only 1½ pfennig per square cm., the production of copper clichés, after previously working the glue clichés, is still very cheap, requires no experienced help and can be produced in quantities.

As Husnik makes his glue plates unsensitized, thus being, therefore, always durable, and as all firms who have acquired his

patent are supplied according to request, the manufacture of the glue clichés is now an easy matter. There is nothing required, but to sensitize the sheets, according to the quantity to be used.

"ON TOUR."

By E. Howard Jaques.

By the time THE ANNUAL reaches our photographic brethren, many of them, especially amateurs, will be eagerly preparing for a Summer "outing," a general anxiety as to the due completion of their kit for a time banishing the many vexed questions relative to the technical details of manipulation subsequent to exposure.

It is for them the following hints, suggested after considerable experience, are intended.

The tourist carrying films is to a great extent independent, is unrestricted in his movements and has many advantages over "he of the glass," and it is to the handicapped traveler that I address myself.

For a fortnight's tour through a country rich in material I allow 1 gross of plates—the size selected should not exceed 5x4 inches—after trying—plate and downwards I incline to ¼ plate, their minimum weight, shape, adaptability for dried lantern slide making and enlarging, being important factors in their favor.

Procure plates of the same batch, reserving a box for experiment as to speed, etc., before starting—for every batch varies in this respect, slightly though it be—carefully unpack the rest, remove all wrappers, cardboard, etc.

Having *thoroughly dried* some thin chemically pure filter paper, cut it into pieces, the size of the plates, dust and repack them face to face, a sheet of paper between the coated sides only, then wrap each dozen in a double thickness of brown paper, or, what is better, ruby fabric and secure them with a strong rubber band.

This done, replace them in the boxes and finally secure with a strong rubber band and string in the reverse direction.

A convenient receptacle for the plate boxes must next be provided. A light but well made dust proof oak or mahogany case, brass bound, answers admirably—its dimensions being of course

governed by the size of plate used, but its shape should be oblong and the plate boxes so arranged within that there is no chance of their moving. To insure uniformity in this respect I have covered a dozen Ilford plate boxes with bookbinders cloth, which renders them durable and their simple parts can be easily opened and closed in the changing bag.

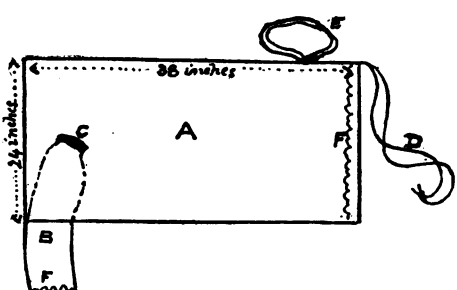
A couple of strips of rubber secured to the bottom of the case will be a further safeguard against friction and a good lock and key will prevent the curious doing damage.

The case should also have a handle by which it may be lifted, and a strap will be a wise addition.

My changing bags are made as follows, the dimensions given being suitable for plates ¼ to whole size:

A piece of best black mackintosh cloth (not having a fluffy material on the reverse side), measuring 76x24 inches, is doubled in the center, rubber side outside, it is then sewn up either side with the exception of six inches at one corner, next the fold, which is left for the insertion of a sleeve, the stitches having a narrow strip of cloth cemented over them on either side, or the joins may be made with the cement (pure rubber dissolved in benzene.)

The bag is next covered with black Italian cloth, which at its open end is turned down to receive a tape, the mackintosh being at the same time sewn in the hem. The completion of the bag will be better understood by reference to the following diagram:



A, the bag. B, mackintosh sleeve, covered with Italian cloth, sewn in the corner, between the sides, the dotted lines representing the part within the bag. C, rubber ring at end of sleeve

to clasp wrist. E, broad-covered elastic band. F, frillings of scarlet jean inside bag, as extra precaution against light.

To use the bag proceed as follows:

First place inside say 4 slides, the plates in which are to be changed, a box of plates from which the string only has been removed, and a pencil. Draw the tapes, which should be of ample length and slip the elastic band round, over the end. Now insert the right hand, with the left adjust the elastic band round the bag so as to clasp the wrist through the material, wind the tapes round the end of the bag tightly so as to secure it round the arm, then insert the left hand through the sleeve.

The plates can now, with a little practice, be unpacked, changed, numbered (by writing on the gelatine at a corner) and repacked with the greatest ease, and (if the bag is properly made) in the brightest sunshine without danger. I have never by this method spoiled a plate though I have changed hundreds under the most trying circumstances. Of course care must be taken not to perforate the material with the corners of the plates. The kit should always include an actinometer, compass, large scale, road map, and a memorandum book, in addition to a record exposure book.

I scarcely ever duplicate an exposure, but occasionally when opportunity offers develop a test plate, the necessary apparatus being small in bulk and weight.

With a couple of pins a piece of canary fabric (2 ft. x 2 ft.) can be converted into a tube of double thickness which placed over a candle affords plenty of safe light.

One of Tylar's (Birmingham) "Willesden paper" developing trays, which will fold flat when not in use, a small bottle of concentrated pyro solution, some dry bromide of potassium and carbonate of soda is all that is necessary, as there is no need to fix.

Provided as I have indicated, many of the difficulties incident to the photography from home disappear, and one need not hesitate to accept his camera as a most agreable companion when "on tour."

PHOTOGRAPHIC EXHIBITIONS.

Rev. F. C. Lambert, Cambridge, England.

The interest in photographic exhibitions is manifestly on the increase. It is, no doubt, an encouraging sign. Possibly one or

two suggestions on the subject may interest those who are about to organize an exhibition for the first time.

1. It is a great convenience to have a good long time of notice given, so as to arrange "which shall where." And the thanks of exhibitors in general (and myself in particular), are due to those "weeklies" who reserve a space for the "coming events."

2. It would, I am sure, be appreciated as an act of courtesy if it became a matter of etiquette to send to exhibitors a catalogue (when such is printed) as well as a free pass. At one exhibition where I was "hung," but unable to visit, I found, on application, that the catalogues were sold out, and thus I am in ignorance as to my companions on the walls.

3. The problem of separation of the large and the small (the sheep and the goats) has been very neatly solved at Birmingham lately by drawing the line at the *8 x 6 print*, thus enabling the "whole plater" to creep into "the large," or march boldly into "the small," according to his own sweet will (and the trimming of his print). I hope this admirable example may find favor and be followed by its general adoption.

4. Birmingham has also set another good example in announcing beforehand the names of the judges.

There seems considerable probability of the photographic army being split up into two great camps, "The Focus and The Fuzzy." Space does not permit me to enter upon this important subject here, but I would ask enough space to point out the importance of knowing beforehand by what standard (focus or fuzz) we are to be judged, and also I would urge each and all to "reserve thy judgment," remembering that perfection is not found in extremes but rather in the "*via media*," not forgetting that each art, music, poetry, sculpture, painting, and even photographic art has its own peculiar limitations, that what in one art may be *sentimental* may in another become *sentimentality*.

EYESIGHT, NORMAL AND ABNORMAL.

By C. Hethton Lewis.

In my article in last year's annual on "Our Eyes and Our Work," will be found a popular description of the mechanism and anatomy of the eye, together with remarks upon the relationship of photographic work to the eye.

From frequent observation I am led to believe that it will prove of value to pursue the subject a little further with special reference to departures from healthy vision, and the methods which should be adopted in the selection of spectacles as aids to sight.

Irretrievable damage is often done to the eyes by the extremely lax way in which glasses are chosen, and it is a matter of frequent recurrence that retailers of spectacles offer, or adapt glasses without scientific examination of the eyes, or knowledge of the real requirements of the case. The chances being 100 to 1 that more harm than good is done.

When the eye views an object, its image is formed on the retina, the impression being conveyed to the brain, and the sensation called ***sight*** results. Now, in the normal state the eye sees all objects beyond 20 feet without effort or difficulty, because the lens and retina are at the natural focus.

The diagram will show this.

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R      L                                O
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R. Retina of eye. L. Lens. O. Object. The line represents the rays from the object brought to a focus on the retina.

All eyes are not normal, however, and in the affection of most frequent occurrence, short sight, *myopia*, the diagram will be

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( —————)————————————————————————————————>
 R     L                                 O
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It will be noticed that the line representing the rays of light fall ***short*** of the retina R. Consequently the image looks misty, just as it would do on our camera focussing screen if the ground glass were placed too far from the lens.

Long sight, ***hypermetropia***, is the opposite defect and is represented thus:

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—(——————)———————————————————————————————>
 R      L                               O
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It will be seen that the focus here falls ***beyond*** the retina.

There is another somewhat prevalent defect, termed ***astigmatism***, and our photographic lenses manifest this.

Take SHORT SIGHT first, this, unfortunately, is on the increase,

is both hereditary and acquired, and in the latter case is chiefly caused by constantly viewing objects close at hand. The eye is bound to exert itself *to focus* for near objects, and the frequent strain results in *elongation* of the eye, from front to back, *lens* to *retina*, so that after a time the image really falls short of the retina, in which case nothing is clearly seen.

When short sight is manifest it is important to secure accurately adapted *concave* glasses, which will prevent further progress of the affection, whilst neglect may lead to serious disease of the eyes. One eye may differ in degree of short sight from the other, or astigmatism for near *or* distant objects may be present at the same time in one or both eyes. Very careful examination by an oculist is essential in all cases.

The ordinary distance that a book or a newspaper should be held from the eyes is about 12 inches. *This* print should be easily read, in a good light, three feet away, so that if the eyes be unable to make out the letters at that distance, short sight is evident.

The *Retoucher* who is *compelled* to approach within eight or nine inches of the negative, is damaging the sight, and should procure glasses.

LONG LIGHT, *Hypermetropia*, is the opposite to that just alluded to; the eye being insufficient in depth from front to back, lens to retina, see diagram. Consequently for *distant* objects the eye is *forced* to focus, just as the healthy eye acommodates *itself* for *near* objects. Hypermetropia is not an uncommon defect in the young, and one not readily recognized. Those who suffer with it find their eyes trouble them, they are sore and weak, and blinking is frequent. It stands to reason that nerve force is exerted in focusing; thus the hypermetropic eye is *always* strained, and sympathetic nervous troubles of the whole system may arise, which are often attributed to other causes and treated wrongly. The diagnosis is not always easy, as symptoms similar to short sight may be apparent, and if unsuitable glasses were given, as has happened in some cases, the result would be disastrous. *Convex* glasses of proper strength will meet the difficulty and remedy the trouble.

OLD SIGHT, *Presbyopia*, is similar in effect to long sight, but in this case it is the lens and muscles of the eye that lose elasticity and power of acommodation. *Near* objects are seen with difficulty, and *convex* glasses should be resorted to.

ASTIGMATISM is not an uncommon defect, and arises from want of symmetry of the cornea or lens, the consequence being that distinct vision is impaired. For instance, on looking at the figures on the face of a clock XII. and VI. may be clearly seen, whilst IX. and III. may look light, faint and misty. Astigmatism is most difficult to diagnose correctly, with the object of prescribing necessary cylindrical glasses of proper strength and degree. A qualified surgeon-oculist should be consulted, as in many cases utterly wrong glasses may be offered by an inexperienced hand, as astigmatism may be complicated with long or short sight.

So far I have touched upon ordinary defects of vision of common occurrence, but it must be remembered that of actual *disease* of the eyes I have said nothing; the subject is of too special a nature, and I only reiterate the statement that in cases of affection of the eyes, advice should be obtained from no other than a skilful surgeon who has made the subject a specialty. As a rule, retailers of spectacles know comparatively nothing, often leaving a customer to pay his money and take his choice; such proceedings are sure to prove calamitous.

The best *glass* when properly worked is quite reliable and better than improperly cut "pebbles." The suitable adjustment and accurate fit of the frame is of vital importance. For eyes that are dazzled by too great glare of light, as at the seaside, a pair of light-tinted smoke glasses will afford great relief.

TO PRESERVE THE SIGHT.—Do not read or work in bad light. Let the light fall on the book or work, and not into the eyes. Do not stoop. Keep the work as far off as possible consistent with with distinct vision. A good sluicing of the eyes in cold water every morning will be found beneficial.

Look after your childrens' eyes and do not scold apparently dull children till you are certain that their eyes are healthy and fit for study. The school training should be conducted in such a way as to obviate injury to the sight; improper position in work, such as stooping, straining and too prolonged application, should be prevented.

The importance of this subject to the individual and to the nation is of vast moment, so I conclude by committing these hints to the earnest consideration of all.

BRIGHTON, ENGLAND.

COLLODION EMULSIONS WITH VARIATIONS.

By Henry J. Newton.

Much interest has been manifested of late in various directions regarding the subject of collodion emulsions. Persistent effort has been and is still being made to increase its sensitiveness, to such an extent that it will equal if not surpass gelatine emulsion, in this as well as in other qualities. If experience is the material out of which prophets are made, then there are a number of persons who might under ordinary circumstances be considered properly qualified to prophesy in relation to the probability of success attending efforts to materially increase the sensitiveness of collodion emulsion, or to an extent which would make it a a successful competitor with gelatine emulsion in this direction. Modern prophets are, however, more cautious about giving public exhibitions of their gifts than prophets of earlier times, they are not so eager to risk their reputation or perhaps it would be better to say not so reckless in predicting with certainty, what will be the result of the problematic future, without first experimenting.

Modern prophets are not quite so sure of the future as were the ancients, their claims are very modest comparatively. They realize the fact that from the womb of nature, marvelous things have come in modern times unheralded and unprophesied. They believe that nature holds many more secrets than she has so far given up, and she will part with them in the ratio of intelligent effort. Looking at the subject of the relative sensitiveness of collodion emulsion we find more than one impediment presents itself.

First, it is composed mainly of vegetable ingredients which cannot be made subject to the same methods for increasing its sensitiveness as those applied to gelatine emulsion; which is composed mainly of animal substance; gelatine is a powerful restraining agent in a developer, it was this fact which first induced me to try the alkaline, or soda, or potash developer on a gelatine dry plate without a bromide and gave the result to the photographic public many years since. It was a long time, however, before I could induce any one to try it. One-half grain of bromide of sodium or potash added to one ounce of carbonate of soda developer will make necessary at least double the exposure which would be necessary without it. Ammonia cannot be used

as a developer without some kind of a soluble bromide. These facts may have no significance as indicators as to the direction of our efforts for some method by which the time of exposure of dry plates can be lessened. My article for the ANNUAL of last year indicates my views on the subject and my experiments have been continued in that direction with very gratifying success. At the time when gelatine emulsion was introduced, there were two methods of producing collodion emulsion. The one which preceded my method was to compound the emulsion in the usual way with a few grains of silver in excess to the ounce, and leave it a few hours to be acted on by the excess of silver by which its sensitiveness was increased. Then the emulsion was precipitated with water, the excess of silver thoroughly washed out and the pellicle dried, in this condition it was supposed to keep indefinitely. When wanted for use dissolve again in ether and alcohol. It was claimed as a reason for this laborious and èxpensive method, that the free salts in the emulsion, which were the results of the decomposition of the nitrate of silver and the bromide salt, if not fatal to the emulsion as a photographic compound, were nearly so. If the necessity for all this labor and expense really existed, then to my mind it was a sufficient embargo on it to effectually prevent it from becoming generally useful.

It was this view of the subject which stimulated me to the long series of experiments which I made and which were published from time to time. In the June number of *Anthony's Bulletin* for 1875, you will find nearly six pages, showing the result of my efforts up to that time. My method was simply after the emulsion had been under the influence of the free nitrate of silver until it had reached the border land of fog, to add a suitable chloride, and instantly convert the free nitrate into a chloride of silver. I then filtered it through Japanese filtering paper, which rendered it fit for use. It generally improved by age, when two or three years old it was in its best working condition. I went through in my experiments every conceivable method of salting the collodion, many of which were published from time to time.

It must follow, therefore, that whoever makes a permanent unwashed emulsion in this way makes Newton's emulsion. There seems to be a class of poachers so ambitious for fame that they are not at all fastidious about the means they adopt to

attain it. They seem to think that any slight and unimportant change in the number of grains to the ounce of salting in an emulsion or in a developer gives them the license to put their names to it and herald it before the public with the assurance of a pickpocket as their great discovery. This class of birds of prey have so multiplied within the last few years that I think some notice should be taken of them, and that they should be held up to ridicule and the contempt which they justly merit.

There would be no perceptible difference in the action of a developer on a normally exposed plate, whether it contained nine or ten grains of carbonate of soda to the ounce, yet about this difference seems a sufficient excuse for this class to prefix their names to a formula.

Any one ambitious for fame as a historian, should, in writing contemporaneous history *know something* about the subject on which he writes. If he trusts to hearsay and gossip, he is liable to be imposed upon, and it follows that the readers of such history will be imposed upon also. I am led to this train of thought in consequence of reading in Anthony's *Bulletin* of February 9th last, what purports to be history, by Mr. F. C. Beach. On page 87 you will find this statement: "On reference of the above to Dr. Higgins, to whom through a perfected formula the honor of the commercial introduction of dry plates in this country is due." Mr. Beach does not make this statement in quotation points, but it is told to you as something that Mr. Beach knows about. Now, as a matter of fact, there has never been any commercial dry plates or commercial collodion emulsion known as Higgins' plates or as Higgins' emulsion, as a commercial article for sale in this country. And further Dr. Higgins has never published any formula for either making dry plates or emulsion. It would, therefore, be very interesting to the readers of the *Bulletin* to know just what Mr. Beach means or what idea he intended to convey in making the statement referred to and his reasons for it. The fog involving this subject will be very much increased when I call your attention to a paragraph in this same article by Mr. Beach on the preceding page, where he says "Dr. J. J. Higgins (I suppose this is the same Higgins) *tells me* the formula he used successfully is that which was employed by Mr. Albert Levy, and *known* as Levy's emulsion. In the *Photographic Times* of September 4th, 1885, Mr. Levy thus describes his method of working." He then goes on to give Mr.

Levy's formula for making this emulsion as published in the *Times*. It appears to be a bromo-iodide emulsion, and if it be true, as Dr. Higgins is made to say, that he used it successfully, then the Doctor is certainly entitled to some kind of recognition, if no more than a six colored chromo. You will find the formula on page 86, of the 9th February, 1889, of the Anthony's *Bulletin*.

It is for fifty-four ounces—why for so large a quantity I don't understand. It will be perceived, if you take the trouble to reduce these figures, that in this quantity of emulsion so constructed, you will have about four hundred grains of bromoiodide in excess, beside the 99 grains of "green chloride of copper."

To neutralize the cadmium bromide, ammonium iodide and copper chloride in Mr. Levy's formula it requires 1,175 grains of silver nitrate. The cadmium bromide alone requires 762 grains of silver nitrate and the formula only calls for 600 grains. Therefore the balance of the cadmium bromide together with 161 grains ammonium iodide and 99 grains of copper chloride are all in excess of the silver nitrate, or unprovided for.

Any one in the least familiar with the photographic chemistry of the bromo-iodide of silver knows that in order for it to be sensitive to light, photographically speaking, it must have, in its primitive construction, silver in excess. It is not possible that a compound made according to the formula published by Mr. Beach as Levy's emulsion could ever, at any stage of its construction or on its completion, contain silver in excess. It, therefore, remains a mystery what office the 99 grains of "green chloride of copper" is expected to perform, as it has usually been added to take up the excess of silver in the emulsion when the excess of silver has performed its office of increasing the sensitiveness of the emulsion, or why the mysterious and mystical number 99 is given instead of an even 100. In this 54 ounces of emulsion there is 1,508 grains of salting or nearly 28 grains to the ounce, and of this, silver forms a small fraction over 11 grains to the ounce. The idea which is intended to be conveyed seems to be that this formula is so definitely and carefully calculated that one grain more of the "green chloride of copper" cooked according to direction, added to the bulk of 1,508 so that it would be 1,509 grains, would be fatal to its efficacy. Mr. Levy must have been an exaggerated Homeopathist, or very superstitious.

He says "pour A into B and leave *exactly* ten hours; then add

99 grains," etc. From my point of view, ten days would have answered just as well as ten hours, as this chloride of copper remains chloride of copper diffused through the 54 ounces of emulsion uncombined with any of the other ingredients, and is not sensitive to light.

It is, however, possible that a portion of the bromo-iodide in the emulsion may be converted into bromide of copper, but there can be no chloride of silver formed, which is the usual intent and purpose of adding a chloride at about the stage indicated by Mr. Levy, and probably was added by him for that purpose. People who volunteer to become public luminaries should exercise some little thought and care, otherwise they are more liable to create fog than clear light.

After an emulsion has gone through the ripening process with an excess of silver, a bromide can be added to take up the excess of silver as well as a chloride, and under these conditions an excess of bromide does not seriously interfere with the sensitiveness of the emulsion. I communicated this fact to Mr. J. Trail Taylor when he was editing the *Photographic Times* and I am of the opinion that he published it in that periodical. I have made collodion emulsion very successfully by substituting the bromide of cadmium and ammonium for the chloride, and I will give a formula which I have worked successfully. For two ounces, first dissolve 16 grains bromide of cadmium and 8 grains bromide of ammonium in one ounce of alcohol, then add 10 grains of a short fiber cotton, then add one ounce of ether. This collodion should stand eight or ten days to ripen. The twelve grains of this compound salt to the ounce will require nearly sixteen and a half grains of nitrate of silver to neutralize the salts. To have sufficient silver in excess, 18 grains to the ounce will be required; this should be finely pulverized and placed in a test tube and for every two grains of silver one minim of water should be used to dissolve it; some heat will be required. When dissolved, add to the collodion in small quantities at a time, shaking well between the intervals. When the silver has all been added, let stand for twelve hours, shaking occasionally, then add three grains to the ounce of the cadmium and ammonium bromide finely pulverized or dissolved in a small quantity of alcohol. Next day it will be fit for use, and will continue to improve by age. The bromide of ammonia dissolves very slowly in alcohol, while the bromide of cadmium dissolves very readily. To overcome this difficulty of

the ammonium salt I made a compound salt by dissolving one hundred grains bromide cadmium and fifty grains of bromide of ammonium in a small quantity of water and evaporating to dryness. Care should be taken not to use excessive heat in evaporating the salt, for by so doing some of the bromide might be driven off and the chemical equivalent of your salt changed. The equivalent of this compound salt is about $123\frac{88}{100}$ and dissolves in alcohol almost as readily as the cadmium bromide. To use this emulsion pour on a clean glass—which has been rubbed with talc to prevent frilling, and as soon as set, put into a tea, made by pouring a quart of boiling water on one ounce of chickory and left for thirty minutes; it should remain in this about five minutes or until the greasy lines are removed. It can then be set up to dry or used immediately.

It is the most sensitive when dry. The sensitiveness when wet can be very much increased by flowing it while wet with an alkaline solution, prepared as follows: To twelve ounces of water, add sixty grains of carbonate of soda and two grains to bromide of potassium; this is the minimum quantity of bromide possible, but will effectually prevent fog, which would be inevitable without it. For outdoor work, where two or three hours time may be required, make the alkaline solution one-half glycerine.

A NEW FOCUSING BAG.

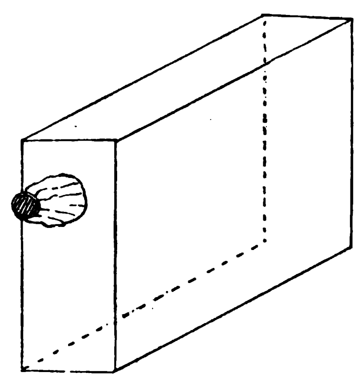
By "Old Gelatine Plate."

The focussing bag or cloth shown in the accompanying sketch, is one of our own specific and individual inventions. We claim it in every detail, from the canton flannel of the body to the seams; from the stitches and thread to the elastic in the sleeve, we claim it entire. We claim it as a whole and in combination with a camera. Now we will not permit any one to try and rob us of the honor of this invention. It will be of no use for some one to rise and say that such a device was in use in 1839, and was described on such and such pages of this or that book. Any remarks of this kind are out of order, and will only serve to show the unprincipled character of those

early photographers who were forever stealing the good ideas of the present generation and trying to rob us of the honor which is our due. We have therefore made it clear in the beginning, that there need be no claim for invention set up in behalf of those piratical ancients.

This cloth has so many advantages over any of the forms in common use that it is hardly worth while to compare them. Even those which are buttoned or looped about the camera are of small value compared with this form.

The cloth is made from two widths of canton flannel, each twenty-seven inches wide and one yard long. These are sewed together lengthwise. Then an end is put in as shown. This end must be of such a width as to easily cover the front of the camera. It must, of course, be long enough to come to the bottom of the sides. This gives a sort of cloth box, with a top, two sides and an end. This is put upon the camera, and, with the front board in its lowest position, a circle is marked where the lens will come. The hole for the lens is made an inch or so



larger than the flange. Into this hole a sleeve is sewn. This should be a little longer than the lens mount, and in its outer end an elastic is placed. If this is not at hand, a double "puckering string," such as our grandmothers used in their workbags, will answer just as well.

With a focusing bag, as this arrangement might be called, we are entirely independent of the wind. Pull as you please, gather it about your head or hat, and you have no trouble with light in front. The cloth does not pull off from the instrument, nor can it blow away. A hole in the bellows is no longer a danger to be feared.

One allows his camera to stand in the hottest, brightest sun without a concern. Light cannot gain access to the interior of the instrument. Gathering the cloth about the tripod, the whole can be carried over the shoulder when it becomes necessary to carry the instrument to a new location. In moving among trees the protection which the bag gives prevents many ugly scratches. How perfectly this form of cloth excludes light, can be judged from the following incident: A party of gentlemen were out on an excursion. There was a new Dallaway's group lens in the party which we were very desirous of trying on one of our own plates. The question was, how? The front board on which it was mounted was only half as wide as our own, and not quite as long. Interchangeable flanges are not to be thought of at a picnic. The best mechanics cannot make new front boards while the sitter waits. But we used the lens and took the picture all the same. The front board with the lens was placed crosswise on our camera. Elastic bands and strings held it fairly in the center. Then the focusing bag was put over all, the lens pulled through the sleeve and everything tucked in snugly in front. The whole was done in less time than it has taken to write about it. The picture was taken as successfully as though the lens had been mounted on a board especially fitted for the instrument.

We have used the form shown in the sketch for the last four or five years, and wonder very much how we ever got along with the ordinary style.

If it is made with a rubber outside, valuable protection against rain is secured. A good quality of canton flannel appears to answer every pnrpose, and takes a long time to wet through. But to be perfectly satisfactory a cloth should be selected that is opaque when held up to a bright light. When this cannot be had two thicknesses are needed. That outside should be of a smooth face, so as not to readily catch dirt.

When work is to be done in the house or gallery, it is a good plan to sew two or three rings along the upper corners. Light rods or sticks can be slipped into them and the cloth will retain

the shape shown in the sketch. One can then walk under the back end and out again without disturbing the hair. It becomes, in fact, a studio cloth, like those illustrated almost every year in the photographic annuals.

While claiming all the honors, emoluments and gratitude due to great inventions, it must be understood that we have given the invention to the world; a grand contribution toward an alleviation of a portion of the distress which has been entailed upon mankind by the introduction of photography to the masses.

CYCLING AND PHOTOGRAPHY.

By G. V. J. Poirin.

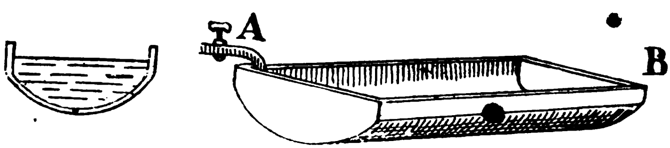
Cycling is a delightful pastime, so is photography, and a combination of the two pastimes is still more so. I have seen articles in various journals on tricycling and photography, but seldom see the bicycle written up as a means of photography locomotion. For small negatives, say ¼ plate or lantern size, it is the very thing, and with an arrangement I have seen lately for making a safety bicycle stand up on the road, it is unnecessary to carry a tripod. On going through London a few weeks since I observed a man sitting bolt upright on a rear driving safety, and on close inspection I observed that the machine carried a knapsack and gun and lantern, with signal apparatus, and I also observed that an arrangement was fixed to the hub of the front wheel and controlled by the brake, which could be instantly brought into use, and the machine could stand up on the road like a tricycle. I ascertained that the machine containing this arrangement (Watkins' patent) was designed for military purposes, but I instansly saw its value for photograph purposes also. In using such a machine I should carry a detective camera on the lamp bracket and have a brake handle fitted to the *left* handle connected with the shutter. When on the road anything of interest could easily be picked off by stopping the machine a moment and without getting off press the left hand brake, the shutter acts and you start on again without anyone knowing that you have been photographing.

Many persons would, doubtless, be cyclists photographers if their front door or gate was wide enough and if they had a place to put the tricycle, to all such and to such as have rear-drivers, I would draw their attention to this machine. I understand that the cost of fitting up a safety, other than the machine it is specially applied to, would be about £2.

A SIMPLE WASHING TRAY.

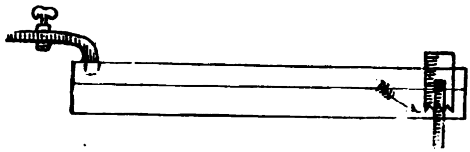
By E. Poole, St. Catherines, Canada.

An excellent adjunct to a photo establishment is a simple but effective washing tray. Such an one is here represented :



Let the tray or dish be made of any material each person thinks best. It may be wholly the segment of a circle (sectional end view) or a segment of circle with upright sides. Suppose it be made nineteen inches wide. Now any smaller size (and all) can be safely washed in such a dish. Suppose forty-eight inches long. Two 18 x 22 plates and almost any quantity of smaller sizes can be washed the same time. Lay one cabt. film *down ;* now two on it, meeting just a center of first, and so on *ad libitum.* No danger of injuring films, and yet thorough washing and economy of space. A, the supply pipe at one end. At B let the dish be deeper, and at that end let the waste pipe run up inside dish (about an inch from the end) to within ¾ or 1 inch from top edge. Under these circumstances the hypo would largely remain in bottom of dish, but the effective remedy is here : Take a piece of iron pipe one inch larger than the wash pipe, and long enough that when in position it shall be an inch higher than the waste pipe. Now cut a

notch or two (large) in one end; then place this pipe over the waste pipe, notched end down, thus:



Now observe the water coming in at one end of dish, washes through and among the plates, caries the hypo towards lower end of dish, and being at bottom of dish is carried through the notches up inside of large pipe (but outside of waste pipe) reaches the outlet and is carried away. I know of no more effective plan for washing negatives.

"WHICH IS THE PROPEREST THING TO DO?"

By Geo. G. Rockwood, New York.

An old discussion is on again which is expressed in the title of the old song, "Which is the Properest Thing to Do?" It concers the old question whether the professional photographer should send finished or unfinished proofs to sitters.

I am a very positive "convert" to one side of the question, and as is the fashion with proselytes, I will give my "experience." I am the more especially induced to make a few remarks upon this subject, as I am in receipt of an inquiry from one whom I consider as among the foremost in the art, asking: "What do *you* do about proofs? Do you finish first proofs or not?" I will answer him and the fraternity, Yes! I do, and the following are some of the reasons why:

I tried the old way of sending out unfinished proofs and I really believe that over 60 per cent. of the sitters came back again and sat over, while the proofs were usually excellent, from an artistic standpoint, and would have finished so as to have been creditable to my establishment. In fact, I became completely demoralized, while the cost of all this waste was something terrific! Of course, if I made only one negative at the

Specimen of "Half tone" Engraving made direct from Photograph, by the Photo Engraving Company, 67 to 77 Park Place,

second sitting, I was supposed to be "mad" because they came the second time. I would explain, argue and show two proofs of the same subject, one unfinished and the other retouched, but they all "knew their pictures were not good," or "could be better." The matter became so serious as to absorb a large percentage of profits. After a good deal of thought I tried the other way. Every day as soon as the proofs are made, I look them over and select the *one* which in all points I think the best (pose, expression, etc.), and have *it* retouched and completely finished, I send it out with the unfinished proofs, and a printed card explaining that the latter can all be finished equally well, if for any reason the patron should prefer the other views. Now for results: A resitting is a rarity; every one is enabled at once to determine whether their picture is satisfactory or not; there is nothing uncertain; the sitter feels gratified at the attention, and they very often order also from the other proofs. Now the cost of retouching and finishing a proof does not approach the cost of the *merchandise* used in a resitting, aside from the time and attention of myself and operator.

After the full adoption of this plan the expenses of my establishment were so reduced as to make a palpable impression on my cash book. Surely, if any photographer ever tries this method, he would never go back to the old system again. It gives me a great deal of time, to say the least. Now all this applies to *adult* pictures; children's proofs are usually good and need so little done to them that I do not think it necessary to make finished proofs. Although sometimes when the subjects are freckled or strong lined, I finish proofs before sending them home. Also sometimes when I have a brilliant Rembrandt or unusual lighting, I finish them so as to insure that the effect is thoroughly presented and appreciated. In sending out proofs I enclose an addressed envelope which brings the proof promptly and without bother to the customer.

When I began, I for a time sent out a card which is here given:

17 Union Square, N. Y.,............188

The "Proof" from your negative is quite favorable; but in order that you may better judge of its quality we have decided to make

A FINISHED PROOF,

which we will send to you in three days or sooner.

We resort to this course from the fact that a strong, effective portrait light often exaggerates the deep lines, freckles or other peculiarities of a sitter. The process of retouching or finishing a negative before printing, modifies or removes any objectionable qualities and imparts a fine artistic finish.

GEO. G. ROCKWOOD.

Now all my customers expect to see finished proofs which I promise in about three days. Another point: Upon return of the proof the order can go on at once and be sooner finished. No one thinks of this quicker than the sitter, and it is often a cogent argument or fact in favor of adopting the proof sent. A check for $1,000 would not induce me to go back to the old system for *one year*. For I know it would cost more than that amount in the time named.

If the fraternity find anything to aid them I shall feel complimented by their adoption of this not new method.

THE SHARPNESS OF PHOTOGRAPHIC PORTRAITS AND ITS INFLUENCE UPON THE ARTISTIC EFFECT.

By Bruno Saemann, Mullhausen.

"A quiet illumination, energetic technical execution, handsome results?" Much is said about the distribution of sharpness, but it is very seldom that mention is made of the influence of the same upon the artistic effect. To comprehend correctly this very sore point in photography, let us look on a large head, about half life-size or more. Here it is extremely difficult, no matter how carefully we draw the focus, to obtain the artistic rest, it being in the nature of a double objective, that the sharpness extends too much upon a certain surface but not upon the body.

If we look, for instance, at the head of an old man whose hair and beard are mixed with gray, the retoucher will surely almost despair in trying to sharpen hair and beard, because, by the incapacity of the objective, a considerable part is of an entirely inextricable representation, which may even be increased to an enormous extent by the incorrect treatment of the illumination. In smaller portraits we do not observe this so much,

and it can be corrected with less trouble by retouching, but the only resource, to evade it on large heads, is by taking a smaller negative and then enlarging it; or, according to Fritz Muller (who was the first to draw attention to it), the front lense of a 5-inch portrait objective is reversed, admitting hereby a much longer focus that there is no necessity to come so near the subject to be photographed to obtain the desired size, and thus distortion is avoided. On the other hand, depth of illumination is gained which by a very uniform sharpness characterized by a delicate gradation, impresses the portrait with the stamp of artistic softness, esteemed so highly in the drawings of the best French artists. If the illumination is correct by application of such a lens, that is to say, that besides the face particularly, the hair will appear naturally, neither black without detail, nor with white spots, such portraits will be unparalleled in their way, and require very little retouching, and here alone is proven the superiority of the high combination lens. Because the less retouching is required, the better the likeness will be, just as a drawing will be of a higher value by having the least number of lines applied in its production. The single lens, of course, possesses less strength of light than the double objective, but this is, nowadays, sufficiently balanced by our present very sensitive dry plates. But, besides this, the rays of light have to pass only one lens, whereby the light interrupted by the second lens of the double objective is regained, and this is quite a considerable amount.

The illumination has also a controling influence upon the sharpness, as for instance, a head (at least on a small scale, on account of the objective), and may be so reproduced by illumination, that every single hair, and all other outlines are sharply visible, but a soft illumination will always appear more natural; yet, by *correct application, it can even be considered as the means to idealize, which is never prejudicial to the likeness*, and thus it has the peculiarity to reproduce softness with definition, and any wrinkled faces with fine gradation. This peculiarity could be ascribed to an effect similar to ærial perspective, the latter having such an evident similarity with it, and the beauty of both being due to very delicate ærial reflexions, which we should also try to obtain in every background, and which are produced by placing the background always vertically, at least one to two metres distance, to obtain less sharpness (but still well defined) than in the fore-

ground— " the arrangement "— and finally by bringing the illumination in harmony with the foreground. Those who understand it give to the foreground a distinctly expressed sharpness, and subordinate middle ground and still more the background accordingly, by a gradual building up of the arrangement, and will impart to their results a fine artistic hue. The sharpness of the background should never be equal to that of the middle-ground, and that of the latter should never reach the sharpness of the foreground, as we frequently see; when, for instance, a group is taken with too small an instrument, and where to obtain more sharpness in the lower parts, the ground glass with the upper parts is placed more backward ; thus the background will appear sharper above than below. For the same reason the background should always stand vertical to the apparatus, as otherwise the linear proportions as well as the aerial perspective will be defective, in consequence of which, the natural as well as the artistic effect will be totally ruined.

NEW PHOTOGRAPHIC EXPERIMENTS WITH CYANIN.

By V. Schumann, Leipzig.

The sensitizing capacities which cyanin develops in the photographic plate are generally known, but only lately cyanin has come more into use. The discoverer of the sensitizing properties of cyanin, Dr. H. W. Vogel, was the first to apply the same during the last ten years for the production of his coloring matter, Azalin, a solution consisting of cyanin (chinolin-blue) and chinolin-red. *Dr. Eder* has also occupied himself with cyanin. Copies of the solar spectrum, obtained on a cyanin-colored plate, and *true to nature* (Report of the Imp. Acad. of Sciences, Math. Nat. ccxciv., p. d. II. div., 1886), have found through him the first large circulation. Capt. Abney worked also with cyanin. The most extensive experiments with the same, at least on cyanin-plates, might have been instituted by the writer of this article; but they are confined only to gelatine emulsion plates; collodion, neither dry nor wet, has never been applied for them. V. Boissonnas, in Geneva, has also worked lately—and with very good success—with cyanin (International Annual of Anthony's Photo Bulletin, 1888, pages 61–71), and the same may be said par-

ticularly of F. E. Ives in Philadelphia (Am. Journ. of Photography, July, 1888, page 181, 82).

During an investigation of the red part of the solar spectrum in the month of March of this year I had occasion to continue my cyanin experiments of 1885. The methods heretofore applied of the sensitizing plates are accompanied with many defects. There are two ways to do this. The ready emulsion is either colored after the washing has been finished (the writer of this article) or the dry plate is colored, in the latter case by batheing in a weak cyanin solution (Dr. Eder and the writer) or by flowing with an alcoholic solution of cyanin (Ives).

Colored emulsion gives generally purer negatives than the plate colored in the bath, but it is also much more insensitive than the latter. This is particularly the case with the cyanin. Further, the former is of weak yellow sensitiveness in the cyanin sensitizing, while a cyanin-bath plate is almost as sensitive for yellow as for red. If a plate, colored with cyanin in the liquid and washed emulsion, is exposed to the solar spectrum, there will appear even under the most favorable conditions only a slightly marked maximum in yellow. The same is mostly so indistinct that only an experienced eye can perceive it. Upon a bath plate, in return the said maximum will rise nearly to the height of the red maximum. Still the bath plate is less suitable for spectrum photography. Its negatives are mostly too soft for spectrum pictures. For this purpose plates colored in the emulsion which give much sharper negatives should be used. Unfortunately they are less sensitive for red and yellow than the bath plate, and can therefore be applied to advantage only where a sufficiently strong light source is at disposal.

The removal of the said defects of the cyanin plate was the aim of my recent experiments. My labors, although not quite finished, have not been entirely without success. Besides the endeavored improvement of the cyanin plate I obtained knowledge of some photographic properties of cyanin which heretofore have not been known.

Without going here into details of my tests in this respect, I would draw your attention to the fact that all work with cyanin requires an increased attention. The cyanin in solution is extremely sensitive to light. It changes not only when exposed to light, but also frequently when it comes in contact with organic matters, and as the emulsion contains such an one, the

gelatine, great caution is required with cyanin experiments. The water becomes not less dangerous for cyanin. An aqueous cyanin-solution discolors by itself, when the light is shut off, and the so discolored solution possesses a reduced sensitizing strength. All conclusions drawn from the test plates can therefore be only looked at as reliable when they are based upon a number of observations, apparently insignificant circumstances had with this sensitizer, sometimes to problematical contradictions. No coloring matter can lead the photographer more astray than cyanin. Ten times and oftener I obtained the same favorable result in my recently finished tests, and then a plate of the same preparation and the same treatment would change its condition entirely. I say apparently, for I found that such circumstances, which in other cases can be disregarded without detriment to the emulsion value and the ortho-chromatic effect, are of great influence to the cyanin plate.

The following is the result of my latest cyanin experiments:

1. *Cyanin acts anti-foggy.* If an emulsion works foggy it can be corrected at once by adding a few drops of an alcoholic cyanin-solution (1:500) before flowing the plates. One to five drops of this upon 100 c. c. of emulsion have the effect that very pure plates will pass out of the developer. In this manner I have corrected emulsions, which lead in no way to a negative free of fog. Still not more cyanin should be taken than just necessary—one sample plate gives the most certain explanation about this—as too much of the same will injure the sensitiveness considerably.

2. *Cyanin is suitable to reverse the negative into a positive.* A plate colored with cyanin changes in the developer and gives a negative, if lamp light is permitted to fall upon the same for a few minutes. But the light should not fall upon the plate before the negative has completely appeared. The reversing of the picture proceeds gradually. It can be followed conveniently. The dark parts of the picture become paler, while the high lights of the same blacken more and more. For a few seconds the negative seems to have faded entirely, but then its return is more and more visible, and if the plate is held against the light it will be noticed that the negative has changed to a diapositive.

A very weak light is oftentimes sufficient to reverse the negative. I have reversed a great number of plates by exposure in

my brown dark room light, the same light which I use for flowing the most sensitive plates.

The process is much easier if the coating of the plates—the emulsion—contains, besides cyanin, a little K I or K Br. or K Cl. Ten drops of a 10 per cent. solution of one of these alkaline salts mixed with 100 c. c. of emulsion gave good effects. It is not indifferent which of these salts is applied. The iodide of potassium acts best; after this comes the bromide of potassium, and the chloride of potassium is the least suitable. The sensitiveness of the emulsion is considerably reduced by the presence of these salts, mostly by K I, the least by K Cl.

Such plates give most peculiar spectra. The spectrum appears mostly in the developer directly reversed. The spectrum of the sun will then appear in the developer as a white band with black lines. Sometimes only special districts will appear in this way, and the other part of the spectrum shows completely the negative character. In the beginning my solar spectra were only reversed in orange, yellow and green; the later tests covered the whole spectrum. The Fraunhofer lines of the ultraviolet appeared particularly complete and clear, reversed.

If the light does not act long enough upon the developed negative, the picture will change only incompletely. The transition of a negative into a positive can in this manner be very well demonstrated on one and the same plate.

In developing such plates a considerable quantity of silver will pass into solution. This is recognized at the bottom of the developing tray, which is covered pretty soon with shining silver. The precipitated silver separates oftentimes from the bottom of the tray and then adheres with great tenacity to the plate in the bath. It settles mostly upon the gelatine and gives the plate an appearance as if it was covered with thick wrinkles. By careful rubbing with a soft finger the silver parts can easily be removed. It is best to let a stream of water play upon the plate during the rubbing. The cleaning is done after fixing.

3. *Cyanin sensitizes stronger for yellow than for orange.* A plate colored in the emulsion with cyanin gives a strong maximum in orange, but in yellow only an extremely weak action will appear. The latter district becomes intense only after prolonged insolation. The cyanin bath plate does much more, as discovered by me. It is more sensitive for orange than the before mentioned plate, and gives in yellow, even if less high, a

marked maximum. In favorable sunlight the maxima in red, orange and blue will rise on a well sensitized cyanin-bath gelatine plate to equal height; the yellow maximum remains always a little lower. But the ortho-chromatic condition of a cyanin plate changes completely as soon as the coloring matter of the nitrate solution (therefore before the mixing of the emulsion ingredients, or if after the mixing of the same, at all events *before* washing of the pellets) is added to the emulsion. If a pure bromide of silver gelatine is colored in the latter way with cyanin before washing, it appears, if I am to judge from the coloration of the emulsion pellets, that the coloring matter experiences no essential change in the water bath. The emulsion has a light rose color. In the spectrum light it seems to be sensitive for orange and blue only; yellow rays act upon it still less than an emulsion colored after washing. Its total sensitiveness is therefore very moderate, and its intensity leaves also a great deal to be desired. In short, such a plate does not satisfy, in any manner, as soon as it is used directly for a photographic view. But the plate shows quite another condition if it is bathed in diluted ammonia. It is not only that its total sensitiveness grows, but it becomes also highly sensitive to yellow light by this treatment.

With the strength of the ammonia bath the yellow sensitiveness increases rapidly. In a bath of 1 per cent. NH_3 the film will become only weakly sensitive for yellow rays; at 4 per cent. the maxima in orange and yellow will reach equal height, and at 6 per cent. NH_3 the latter will surpass the former in height and width to a visible degree.

The plates bathed in ammonia can be applied wet or dry, but I advise the dry plate. It works cleaner, more intense and is much more sensitive than the wet plate.

Wet plates have a great tendency for fog. They are strongly sensitized, and if they come into the developer in an ammoniacal condition—I worked always with soda-pyro—then they will assume that disagreeable coloration which is described on the surface as green, and in a transparent way as a changeable red.

Sometimes the fog remains away, if the plate, having the odor of ammonia, is washed for a few minutes in a stream of water before it is plunged into the developer.

This process is by no means reliable, and I would therefore advise once more the use of dried plates.

The drying should be quick and thorough. The film should contain no free ammonia, as otherwise red fog will appear. But it is here less offensive than upon a wet exposed film.

The durability of these cyanin plates is not very great. A few days after sensitizing in the ammonia bath their sensitiveness will already change. They will work then less clear than shortly after drying. Reversed, the mother emulsion plate will work thin, and is to a high degree insensitive, if a longer time passes between flowing and developing.

The foregoing method on sensitizing with cyanin would, for this reason, be suitable only to those who prepare their own emulsion. For manufacture on a larger scale the process cannot be recommended. But to scientific photography it might be of excellent service, for it secures great purity and sensitiveness, which united were not always to be found with the cyanin plates of the usual sensitizing method.

I deem it necessary before I conclude to make still a few remarks about my experiments, which lead to the before mentioned cyanin plate. The complete success of the same depends upon the observation of certain rules.

All emulsions which I applied for my last cyanin experiments had been produced after the ammonia silver method of Dr. Eder. The duration of digesting was, on an average, one hour, and the medium temperature + 40°C. Of the cyanin solution in absolute alcohol 1:500, I took 2½ to 3 c.c., upon 100 c.c. of emulsion. With the nitrate of silver solution the cyanin will give a handsome blue liquid of weakly reddish fluorescence. The handsome blue coloration shows better in lamplight than in daylight.

The emulsion should not be washed too soon after the finished digesting, and should be left standing for a few hours in a congealed condition. A ripening process seems to take effect during this time succeeded by a yellow sensitiveness, in which this emulsion excels so advantageously. If only half an hour passed between digesting and washing during my tests, not a single plate would give me the high sensitiveness which I had recognized during a congealing time of three hours, not only in yellow but also in white light. The congealing of the emulsion takes place at a temperature of from + 12 to + 15°C.

The emulsion should not contain any iodide of silver if the cyanin is to sensitize with full power. Emulsion containing iodide of silver increases the blue sensitiveness of the plates, but

not the sensitiveness for red and yellow rays. The latter sinks the more iodide of silver the plate contains. Pure iodide of silver gelatine is for optical sensitizers even quite insensitive.

For developing I have used the soda developer, as recommended by Dr. Eder. [Die photographie mit Brom. silver gel., by Dr. Eder, page 225.]

My dark room illumination is by means of a light which burns under a glass globe. The globe has a triple covering of brown tissue paper. In this light I develop all plates, the most color-sensitive not excepted. It is completely ineffective if I do not bring the plate quite close to the globe; at a distance of 20 to 30 c. m. there is no fear of fog taking place. Red light, such as passes through red flashed glass, is entirely unsuitable for cyanin plates, these being sensitive for the rays that passed through. Through red flashed glass, I photograph, for instance, the spectrum red of the kerosene light without any hindrance at short time of exposure.

Notwithstanding the safety of my dark room light I work a good deal in absolute darknesss, and this only to protect the sensitive plate against even the least light, which might strike the same at the inopportune moment.

All manipulations, from the flowing to the fixing of the photographic plate, I do in total darkness if required.

The color sensitiveness of the plate I find out with the aid of my Quartz spectrograph. My kerosene lamp, used for spectrographic purposes, serves as a light source. The flame of this lamp is screened to a circle of 5 mm. The bunch of rays passing through the opening is condensed in the jet of the spectrograph as much as possible by a light condenser, consisting of two cylindrical lenses. The light effect is of great constancy. Solar light can be used only conditionally for testing the color sensitiveness. Its instability makes it quite unfit for long tests of this kind. In 1883 I have already called attention to this evil in an article about my eosine experiments (Photo. Wochenblatt, published by Dr. Stolze, Berlin). Dr. H. W. Vogel has also lately confirmed, photographically, the deviating light proportions of the several spectra districts of sunlight.

The results obtained with kerosene light cannot be compared at once to sun and daylight. The kerosene light is particularly rich in yellow and red rays, but poor in blue ones. This is reversed with sunlight and diffused daylight is still poorer in illu-

minating rays. This circumstance has to be taken into consideration if the color sensitiveness of a photographic plate, as compared to sunlight, is to be judged by a kerosene spectrum.

With the last mentioned instruments I intend to continue my cyanin experiments, and to determine above all what can be attained in the red of the solar spectrum by means of these cyanin plates.

A FEW FACTS ABOUT LENSES.

By George Smith.

The most unscientific photographer must feel a need for knowing something about the instruments he has to work with, and though he may feel that it is beyond his powers to grapple with the intricacies of the whole subject. I believe that a quite elementary description of the first principles of the optics of photographic lenses may not be beyond his ambition.

The first law of optics is that objects at the same distance from the lens come to a focus at the same distance behind the lens.

Thus, if a photographic lens was directed toward the stars, the image of each star would be found at the same distance from the lens.

To be quite accurate, it must be measured from the optical center of the lens. In an ordinary single lens this point is a fraction nearer the focusing screen than the central point of the surface of the lens. In a rectilinear it is where the stop should be placed.

This distance, so found, of the image behind the lens is the *principal focus* of the lens.

Now the necessary result is, that the field of every lens is curved to exactly that of a ball or sphere, of which the focus of the lens is half the diameter.

The second law of optics is, that nearer objects come to a focus further from the lens than distant ones.

These longer foci (of the same lens) bear a distinct relation to the various nearer distances of the object, and are called *conjugate foci.*

They are easily calculated. Thus: Supposing the lens has a principal focus, found as described above, of 6 inches, for objects

at a great distance, and is directed on an object 10 feet away. 10 feet will be just twenty times the focus of the lens. The lengthening of the focus, that is the *conjugate focus* of an object 10 feet away will be one-twentieth of the principal focus of the lens—six-twentieths, or more simply three-tenths of an inch, $6\frac{3}{10}$ inches.

We are now ready to understand a little better what is really taking place inside the camera.

It is evident that all the aerial image of perfect sharpness must lie somewhere in a space of three-tenths of an inch thick.

I can best describe its shape as a piece of the peel of a large orange 12 inches in diameter with a 6-inch lens; of 6 inches diameter with a 3-inch lens, the piece of orange peel being cut to the size of the plate employed.

If now the reader will take a pair of compasses, and setting out a central line and two lines parallel to it, each 2 inches on either side, on a piece of paper of about 14 inches in length, the outer lines will be the boundaries of a 4-inch circle. Let him then measure off on the central line 3, 6, 9, 12 inches and draw 4-inch lines at right angles to the central lines. Let these lines represent the sensitive surface of the photographic plate.

Then, continuing the calculations for the amount of in and out focus of various lenses, he will find that for a landscape or an interior, where there is distance and objects ten feet away the in and out focus will be

Lens 3 in.	40	takes the focus	$\frac{3}{40}$	of an in. lengthwise	or	$\frac{1}{13}$	of an in.
" 6	" 20	"	$\frac{6}{20}$	"		$\frac{3}{10}$	"
" 9	" 13	"	$\frac{9}{13}$	"		$\frac{3}{4}$	"
" 12	" 10	"	$\frac{12}{10}$	"		$1\frac{2}{10}$	"

Next, taking the compass and starting from the bottom of the central line describe the parts of circles, first that exactly touching the horizontal line representing the plate surface, which will give the representation of the position of distant objects. Secondly, make the part of the larger circle representing the position of objects 10 feet distant from the lens. If he then roughly shades the spaces between these two circular lines, this will exactly represent the practical position of the sharpest possible photographic image. He will learn that when a 6-inch lens is made to cover a 4-inch circle it is possible by the natural curve of the field to get distance and foreground in focus together with a large aperture to the lens, if the various objects are arranged

in a deep basin-like shape. He will further learn that this does not hold good for a 3-inch lens covering a 2-inch circle, or for a 12-inch lens covering an 8-inch circle. He will learn that there is no such thing as "depth of focus" in a lens, but that the more perfect the lens, the more certainly every separate plane is distinctly differentiated, and I hope that by carefully considering the principles involved will begin to understand why some lenses seem to "cover better than others, and also why sometimes much stepping down is needed.

A RAPID METHOD FOR THE VALUATION OF QUINOL.

By John Henry Smith, Ph.D., F.I.C.

Dissolve one gramme of the sample of quinol to be tested in one litre of distilled water. Take 50cc. of the solution in a small beaker, add a few cubic centimeters of dilute sulphuric acid, raise the solution to nearly boiling point and titrate with standard potassium permanganate solution. At this high temperature the permanganate is rapidly consumed until a certain stage is reached at which the decoloration becomes very slow. This point, however, is sufficiently definite to allow of fairly accurate results being obtained.

The standard solution of permanganate which I employ is made by dissolving 12 grammes of recrystallized $K_2 Mn_2 O_8$ in one litre of distilled water, and diluting until 1cc. is equivalent to 0.02 gramme of iron wire, as determined by direct estimation.

The final point of titration is reached as soon as an additional drop of permanganate requires 20 seconds to decolorize, and it will be found that at this stage the quinol has absorbed oxygen to the extent represented by the ratio

$$C_6 H_4 (OH)_2 + O_{10}$$

As one cc. of the standard permanganate solution corresponds to 0.00285 grammes of oxygen, it can easily be calculated that in the case of absolutely pure quinol 50cc. of the above solution would require 25.5cc. of permanganate, from which the percentage of quinol in any sample can be reckoned.

By oxidizing with excess of permanganate in acid solution in the manner I have already fully described (Journal of the Society of Chemical Industry, Vol. VI., pp. 98 et seq.), more accurate re-

sults can be obtained, in which case the oxidation is complete, thus:

$$C_6 H_6 O_2 + O_{12} = 6 CO_2 + 3H_{20}.$$

As a special solution consisting of sodium phosphate and ferric sulphate, as well as a standard solution of ferrous sulphate for reducing the excess of manganese compounds, is required, the method would probably be too tedious for any other than a specialist.

By the above methods I have found about 98 per cent. of pure quinol in samples of the commercial article obtained from Messrs. Mawson & Swan, Newcastle-on-Tyne.

The above rapid method in conjunction with a trial in the developer, would serve the practical photographer in guiding him in the selection of a suitable sample of quinol.

A STIMULUS TO PHOTOGRAPHING OPTICAL PHENOMENA IN THE ATMOSPHERE.

By R. Spitaler, Vienna.

The amateur photographer who applies the art, not only for taking now and then a view of some handsome scenery, or to excite the curiosity of his friends by an instantaneous picture, but who also employs his knowledge for the promotion of the art; and whose efforts are to bring photography more and more into use, not only for practical purposes, but particularly to make it useful for scientific investigations, art and industry, finds, wherever he turns, an abundant opportunity and matter enough to make himself useful. He must not, of course, be disheartened by unsuccessful attempts, but steer with perseverance towards the goal.

For such pursuits it is absolutely necessary, although neglected too often, to keep an exact and detailed descriptive account of all views taken. The negatives should always be numbered, and the several circumstances connected with taking the view, such as the kind of plates, degree of sensitiveness, time of exposure, diaphragm opening, intensity of illumination, if orthochromatic plates were used or not, the former with or without ray filter (yellow glass), focal distance of the objective, and many other things, as the kind of development, if under or over exposed, etc.; should all be entered carefully in a book, to avoid loss of time and materials by a repetition of fruitless experi-

ments, and perhaps the final giving up of all further attempts. All these little details, if not properly booked, are easily forgotten or mixed up.

Just as the amateur astronomer can make himself very useful, even without the aid of expensive and large instruments, by celestial observations with the naked eye or an opera glass, the amateur photographer, with his plain apparatus, and without the possession of a large photographic telescope, can make many interesting studies of the heavens.

It will be remembered, what handsome and interesting results can be obtained by photographing a flash of lightning, and yet systematic researches in this respect are wanting at the present day.

What a rich field for photographic studies are the clouds. Not only views of the different solar cloud cycles would be of great interest, but particularly simultaneous views from two different places, to determine thereby the height of the several solar cloud cycles, which for the recognition of atmospheric occurrences would be of great value. Experiments in this direction were already made at Kew, England, and have led to good results about the height of clouds.

Very meritorious would be views of the so-called "luminary night clouds," to which Jesse in Steglitz called attention, and about which the journal "*Heavens and Earth*" has a more extended article. "While the so-called cirri or land clouds have an average height of 13 kilometres, the luminary night clouds float at a height of 75 kilometres." They appear, as far as known, only during the Summer months, pending twilight or the morning dawn, and disappear as soon as night or daylight sets in. Almost unnoticed have remained so far, photographically, the views of the optical phenomena around the Sun and the Moon, as they happen to form from day to day, if the sky is covered with a fine milky veil of clouds or vapors. These are the solar or lunar rings with their oftentimes very complicated side rings, solar columns, etc. Their colored character would recommend the employment of orthochromatic plates, as the solar phenomena requires at all events quick working shutters and protection of the plates upon the back on account of reflections.

If views of this kind are intended to become of scientific value, the focal distance of the lens used has to be exactly known, the

time of taking the view must be stated, and the picture, if posible, should also have metereological data of temperature, pressure of air, degree of moisture of the atmosphere, etc.

It would give me pleasure if I succeeded through the foregoing lines, to stimulate the study of these phenomena by means of photography, and to see reports about the same in the different journals.

EMULSION PAPERS.

By Dr. C. Stürenburg, Munich, Bavaria.

The great discoveries which, within the last twelve years, have caused an entire revolution in the photographic negative process, have also not been without influence in the different copying processes and enlarging methods, as may easily be imagined; and a gradual change has likewise taken place here during late years, which undoubtedly will revolutionize this branch of photography as much as has already been the case with the negative process.

We know that the principles, the chemical theories, upon which the production of the light sensitive bromide of silver emulsions and the treatment of the same by development of the picture are based, differ greatly from those of the wet collodion process with silver baths; and this is the case with the bromide —and chloride of silver emulsion papers introduced lately.

While all the older photographic papers, with the exception of some development papers, had to be exposed to a continued action of light until the pictures had obtained completely the required strength—and daylight was *absolutely* necessary for this purpose—a very short action of light analogous to the treatment of the negative plates, is sufficient for the emulsion papers, and the action of light is then continued by suitable development until the picture has acquired the necessary strength.

Diffused daylight as well as the light of an ordinary kerosene lamp—and the latter even with greater advantage—can be used.

This possibility of the use of an ordinary artificial light is, in comparison with the older copying papers, an enormous advantage, which cannot be highly enough valued. While, when using the older papers (the albumen paper included), during foggy and gloomy weather, a whole day was hardly sufficient generally to

finish a single picture, thus causing, of course, quite often very disagreeable embarrassments, the photographer, under the present conditions and independent of any atmospheric influences, can meet his obligations without the least difficulty. To this may be added that, particularly when chloride of silver gelatine paper is used, the tone of the pictures can be changed more or less by application of different developers, so that, with one and the same paper, brown and black tones can be obtained.

Another advantage, not to be underestimated, in the use of the emulsion papers for printing by contact (under the negative), is that, from one and the same negative, by modification in the composition of the developer, delicate as well as harder or stronger copies can be obtained; while, in the albumen paper process, the character of the print depends entirely upon the negative, unless papers from different manufacturers should be used.

I mentioned before, that it is advantageous to use artificial light for copying in the printing frame, instead of daylight.

The great sensitiveness of these papers and their inclination to give dark prints when too long exposed, make it, of course, important to find the correct time of exposure. Now, as the exposure in daylight, according to the kind of paper, is restricted to one to two seconds for bromide of silver paper and four to eight seconds for chloride of silver paper, an over exposure is very easily possible. But as the exposure to kerosene light for the former paper is from ten to twenty seconds, and for the latter paper from two to four minutes, the safety for a correct exposure is much greater in the latter case.

The emulsion papers have obtained a great significance for the production of large paper pictures, particularly portraits. While the older papers (development papers for enlargements were also produced formerly) had to be always exposed until a faint picture was visible, and sunlight was mostly required for this, the new papers offer the great advantage, that enlargements can be made of any size in ordinary daylight as well as lamplight, without using much time for exposure.

Against the older methods, to take from a diapositive a negative of the required size, and to copy the same afterwards upon arrowroot or albumen paper, the direct emulsion paper process offers great advantages in an *artistic* relation.

It is a fact that pictures, enlarged directly upon paper from

the small original negative, show more plastic roundness than those produced by way of the diapositive. Such enlargements are also much finer and stronger and do not require so much retouching.

As any kind of paper that, with a rough surface included, can be prepared with emulsions, enlargements of a very handsome artistic effect can be obtained by producing them upon paper with a grain and then working them with crayon. If this manner is applied, pictures will be obtained which leave the impression of pictures painted in gray. All that is necessary for this purpose is to give the enlargement only a little more brownish tone, and let the black shading pass into crayon. Enlargements upon rough surface paper can also be worked very nicely with the brush and India ink.

Not only will the practical photographer have his advantage from the properties of these new papers, but particularly also the amateur and the artist.

Being used to procure his dry plates from the manufacturer, he will do the same with the paper and thus save the trouble of preparing them himself.

The production of copies upon emulsion paper, which can be bought in market, he will easily learn after a few instructions; the enlargement of small negatives requires much more experience and more arrangements, so that it is preferable to leave this part to the professional photographer. The execution of the picture he then can do himself.

I come now to a point, which, in regard to the question of utility, is of the greatest importance: *What durability do these pictures possess?* It is a fact and has been proven by experiments, that developed pictures upon paper—even those of the older papers—possess a much greater durability than the completely copied ones. The latter, particularly the albumen paper prints, contain organic silver compounds derived by the action of the free nitrate of silver upon the albumen paper and subsequent decomposition by light. But in developed pictures, particularly if the oxalate developer was applied, the pictures consist mostly of metallic silver. And further, in development papers, as a rule, the *albumen,* one of the principal factors against durability, is wanting entirely; herein alone a principal reason is to be found for the greater durability of developed pic-

tures. Particularly, as the fixing solution can be applied much weaker than that for albumen pictures.

In a still much higher degree this is the case with the development papers, particularly the bromide of silver papers.

A great durability of the pictures is already secured, in that, in the preparation of the paper, absolutely no nitrate of silver comes into contact with them; the gelatine also remains completely neutral toward the bromide of silver contained in it. The hyposulphite of soda is held pretty solidly by the gelatine, but the film on the paper is much thinner than for glass plates; further, in washing, the water can act evenly on both sides of the paper, while in the albumen paper it is held back from penetrating into the paper by the coagulated albumen cover. It can therefore be said, that the develpment pictures possess a greater durability than any other photographic picture.

Concerning the treatment of the different papers (Eastman paper, Dr. E. A. Just, in Vienna, Liesigang, Dr. Stolze), only the first mentioned two were left with me for examination. Both papers have their peculiarity. The Eastman paper (bromide of silver) is less sensitive than that of Dr. Just. With oxalate of iron developer it develops in a warm black tone; it demands a soft negative. Dr. Just's bromide of silver paper is about twice as sensitive as the former, and care should be taken to avoid over exposure.

The Chloride of Silver emulsion paper from this factory is quite excellent, and is decidedly to be preferred to the former, on account of the greater richness of tones to be obtained. Its reatment is also easier, the former being less sensitive. Still he sensitiveness is sufficient to make enlargements in the camera by daylight from such negatives.

Nothwithstanding the excellent properties of these papers, the albumen paper asserts its old place in the photographic galleries, and so far they have not been able to displace it.

But the reason for this is to be found greatly from external circumstances. The beautiful glass, the clearness and strength of the albumen pictures has spoiled the public, in consequence of which it has very little taste for the artistically handsome, but less brilliant emulsion paper pictures.

In favor of its adoption speak the easy treatment and safety with which the development of the picture can be followed up. The photographer is fully intimate with the work, so that even

the chloride of silver collodion paper, which furnishes still finer and more brilliant pictures, has as yet met with very little favor.

But the advantages which are offered by the emulsion papers, are so great that their general introduction into photographic galleries might only be a question of time.

For this purpose such modifications should still be made in the manufacturing of this paper that the wishes of the public, which have to be respected by the portrait photographer, should be taken into account.

Above all, the attempt should be made to produce a paper *possessing gloss* about the same as albumen paper and then it should have some coloration, no matter how faint. One is so accustomed to the pink of the albumen prints, that every other tone is considered cold. The artist, of course, will not care about such things, but the largest part of the customers of the photographers are not artists, but people who will look at things as they appear.

Technically, that is in its treatment, it should be simplified as much as possible. But the gelatine has its own peculiarities, and one of these is that it easily dissolves in a warm temperature. It would be of great advantage, if it was possible, to produce an emulsion paper which would possess a gelatine film that could not be dissolved. The development should also be simplified and should consist of only one solution. A good picture can easily be ruined by a badly composed developer.

We have succeeded in the composition of a hydroquinone developer for emulsion plates, using *one* solution. If the exposure was somewhat long, the picture will appear quicker; if it was of shorter duration, it will appear slower.

Now, is such a developer (modified) not possible for emulsion papers?

There is hardly any doubt that, if such defects are removed, this (for many photographic branches) very excellent paper will also be made useful for those branches where albumen paper is applied at the present time. The general introduction of it will then be possible, creating thus a general revolution in the methods of working the photographic art.

SIMULTANEOUS EXPOSURE AND DEVELOPMENT OF BROMIDE OR CHLORIDE ENLARGEMENTS.

A FIELD FOR EXPERIMENT.

By P. Swanson.

The introductiou of hydroquinone in combination with a fixed alkali as a developer, opens up a new method of developing gelatino-chloride or bromide emulsion which ultimately may result in revolutionizing the existing methods.

In the fewest words possible I shall indicate the direction in which experiments should be made. My own, as yet, have been few in this particular branch, but the results are so promising that a brief sketch of one may be found worthy of a place in the INTERNATIONAL ANNUAL.

What I wish to demonstrate is this: that we have now reached the point in the exposure of bromide and chloride papers that we can SEE when the exposure is enough.

To avoid theorizing, here is the formulæ:

Hydroquinone	6 grs.
Potas. Meta-bisulph	4 "
Glycerine	4 dr'ms.

Water add to make one ounce.

When required for use add 10 grains of caustic soda to each ounce of solution.

Take a piece of perfectly clean glass of the size your enlargement is to be, and a piece of bromide paper of the same dimensions; place the paper emulsion side downward on the glass and proceed to paint the back of the paper with the developer. Allow a minute or two to elapse to permit the paper to expand, then turn the paper over and serve the emulsion side in the same fashion. It will now lie nicely on the glass and adhere even in an upright position (by capillary attraction). All that remains to be done is to place the glass carrying the prepared paper on the enlarging easel and let the image fall on it as in ordinary enlarging, But with this striking difference, the exposure and development proceeds simultaneously, and you have only to sit with your red lantern in your hand ready to arrest both at the right moment.

Innumerable modifications will suggest themselves to the intelligent operator.

On alpha paper I hence produced enlarged pictures that afterward could be toned to any shade.

Too much solution must not be used on the sensitive surface, or it will run in streaks and so cause marking. The parts on which most developer rests, "come out" most rapidly and boldly. This suggests a simple method of local development. With a brush charged with developer you can retouch the picture as it gradually appears. If it should appear to quickly, cap the lens or insert a smaller stop.

MAKING STEREOSCOPIC NEGATIVES IN BRITTANY THIRTY YEARS AGO.

By H. D. Taylor.

In 1859, being then engaged by Mr. Lovell Reeve to assist him in the publication of the *Stereoscopic Magazine*, I accompanied him and his friend, the Rev. J. M. Jephson, on a trip to obtain some stereoscopic negatives intended to illustrate a walking tour in Brittany, which Mr. Jephson proposed writing. I had very short notice to prepare our apparatus. To quote from a note by Mr. Reeve in this book, "Our apparatus consisted of a small double lens landscape camera by Ross, a black tent about four feet square and seven feet high, fitted with table and sink, the whole folding up into a moderate sized portmanteau, and two boxes of chemicals, one for use and the other for store, with a third box containing in a small compass, a gross of glasses comprised in six inner boxes of two dozen each. * * * * The result was we visited thirty towns and villages within the space of thirty days, pitching our tent about a hundred times, during which Mr. Taylor could not have taken fewer than two hundred pictures, from which the present ninety have been selected for publication. In explanation of this, I may observe that the book was published by itself, and those who wished for the illustrations obtained them in a box for five guineas extra.

We started from Southampton at midnight of August 9th, for Jersey, where we took the French steamer for St. Malo. We commenced operations here, the natives much puzzled by our proceedings. One lad, seeing the shining leather case out of which we had taken the tent, inquired, "Faites vous les bottes, Monsieur?" Another observed to a bystander that we were

going to take portraits and was anxious to know at how many sous "la piece." Another asked, "Quel comedie fait il?" Our next step was to St. Briene. Mr. Jephson undertook to walk, and started for that place by way of Lamballe. Mr. Reeve and myself took the steamer from St. Malo to Dinan, up the river Ranco, from thence by diligence through Lamballe to St. Briene. Dinan afforded some good subjects for the camera. At St. Briene we hired a vehicle and driver to take us on our journey. This driver was a youth of about sixteen, and knew something of French in addition to his native Breton. The country people knew nothing of French, and he, therefore, was useful as an interpreter. Guimgamp was the next place, the streets and houses very picturesque, which supplied us with many good subjects. Our next move was to Lanleff, where we went to see and photograph the ruins of a round church (called the Temple). We arrived too late, owing to the badness of the road, to attempt any photography that evening; but as there was no inn in the place, we were compelled to seek a lodging for the night, and in our extremity knocked at the garden door of the pastorage. We were not aware that Mr. Jephson had been there, but were agreebly surprised by a ready invitation to enter. Owing, no doubt, to the good impression he had made, though M. l'Abbé had gone to bed in order to start at midnight for the fêtes of St. Briene in honor of the Emperor's visit, he dressed himself and came down and did not retire untill he had shown us two comfortable bedrooms, prepared a supper of three or four courses with wine, etc. On the following morning we obtained two fairly good negatives of the church in a drizzling rain, in which we journeyed to Tregnier. Here was a beautiful cathedral, but the weather continued unpropitious and our negatives were not first rate. At Launion, our next stage, we were more fortunate. The weather was beautiful. There was a most picturesque market place, very curious old houses with amazing tiers of slated hoods protecting the windows; one with turrets, beside which the leaning tower of Pisa is a baby, as Mr. Jephson says. Altogether our work was most satisfactory. From hence we visited the Castle of Tonquedec, a most lovely ruin, quite out of the route of ordinary traffic. The road was very bad. We were late, and could only secure one negative where, if we had the day before us, many good pictures might have been obtained. Returning to Launion, we next proceeded to Morlaise and St. Paul de Leon.

Morlaise is a beautiful old town, enclosed between two steep hills, the houses being built against the hills so that you may walk out of the top of the house into the garden. "De la mansarde au jardin comme on dit a Morlaise." There are several churches at St. Paul de Leon, notably one called Notre Dame de Creisker. A gentleman who traveled with us from Jersey to Phillalo warned us that if we attempted any photography here we would be stoned for witchcraft. We, however, escaped this catastrophe. We left Morlaise, and passed on to St. Thegonec, Lampaul, Guimileau and Plougastel, in all of which we found remarkable specimens of the Calvaries for which this part of the country is celebrated. They are representations in stone of the several scenes at the crucifixion stated in the Gospels. At Easter, a priest followed by the people visits these sculptures and explains them. We secured many negatives of these curious and beautiful works of art, which are admirably suited for photography from their complicated groups of figures which it would be difficult if not impossible to copy by hand. After passing through and obtaining many negatives at Chateaulin, Quimper, Quimperlé and Heunebon, we arrived at Auray, when we were in the district of the remarkable Druidical Stones of Carnac. This place is covered with huge upright stones placed in some order; they are called Menhirs. There are in the neighboring villages numbers of other Druidical remains called Dolmens, Cromlechs, and others resembling Stonehenge. It is supposed they were originally sepulchral monuments, but were also used for religious purposes, and it is said for sacrifices. We obtained excellent negatives of many of these. Vannes was our next resting place, from which we made a trip to the Castle of Sacénio, where we arrived rather late in the day, but succeeded after some difficulty in obtaining a satisfactory negative. At Vannes, which is a fine old fortified city with huge walls and gates, we got some good views. Instead of going direct to Rennes, we took a circular route by Baud, Napoleonville, Loudeac and Josselin. We had heard of a remarkable statue of Venus at Baud. On inquiry we were told it stood in a wood at no great distance, where I went with a girl for a guide. It stood in a most impracticable position for photography, but anywhere it would not have been worth taking. It was, perhaps, some seven or eight feet high, and intended for a Hottentot Venus, if for any of that divinity. We heard a legend of it afterwards that it was at some

remote period placed in the village, when the natives paid it some homage, which induced the clergy to have it taken down and thrown into the river. This was succeeded by a great downpour of rain, attributed by the country people to this desecration of their idol. To avert a second deluge the clerics had to fish it out of the river, and of course the rain ceased immediately.

At Josselin, we found a picturesque old town with a fine chateau, partly in ruins, of the Prince de Leon, of which we took some good negatives. Our attention was called by the Prince and Princess, who were staying here, to a white marble mantelpiece in a deserted hall, with the arms of the family ornamented with foliage and unknown animals carved in high relief with the motto "á plus." I was able to take a negative of this, which was very dimly lighted, by the use of a pair of small portrait lenses which I had brought, but had no occasion to use before.

We proceeded by way of Ploermel to Rennes, which, from its Parisian streets and shops, was not attractive to the photographer. The charges at the hotel were Parisian. We had been accustomed during our tour to pay very moderately at the inns; for instance, a dinner of several courses, with wine, costing about a franc and a half or two francs.

Our route, approaching the end, lay through Hédé, Combourg, Dal to St. Malo. We were fortunate in securing a good picture of the Castle of Combourg, the home of Chateaubriand. Our last negative was of a fine old porch at Dal. I was not sorry to bring my work to a close. We traveled about twenty-four miles a day, and took one negative in spite of the weather. We sometimes put up the tent four or five times a day. Altogether, though fatiguing, it was a very enjoyable journey. In these days of dry plates it would have been comparatively easy. Before I went, I had made some experiments with my own dry plates, and on a Winter's day, with the snow on every branch of the trees, I obtained with them three negatives which I sold for five guineas, but I did not feel sufficient confidence in them to warrant any depending on them for such a journey as a trip to Brittany.

LARGE DIRECT HEADS.

By J. Traill Taylor.

When a large head is taken direct by means of a portrait lens of unusually great dimensions, a difficulty is not unfrequently

experienced in getting the various planes of the face in equal focus. This is more particularly the case when, in order to obtain a head of sufficient size, the camera is placed at no great distance from the sitter. The better the quality of the lens, the more pronounced is this peculiarity. I am referring just now to portrait lenses of large diameter, which I know are, or used to be, more frequently employed in America than in England for this purpose.

When with the full aperture of such a lens the focus, in the case of a three-quarters face, is made on the eye, the nose and ear suffer by contrast with the excessive sharpness of that part on which the sharpest focus was made, and this applies not only to the planes of a large head, but to those of the rest of the figure when any considerable portion of the body is also sought to be introduced.

Practical photography was not many years old ere artistic, in contradistinction to scientific, photographers raised an objection against that excessive minuteness of detail in the reproduction of the face which showed all the pores and asperities of the skin with the smallest of its wrinkles, more especially when these were delineated in a pronounced degree in one portion of the face to the exclusion of definition in all others. A suggestion was at that time made as to the desirableness of placing the face a little out of focus in order to ensure what these artists termed a greater degree of softness by a degradation of the definition. But this would only be transferring the maximum sharpness from one plane to another, while those parts out of focus would have their fuzziness increased.

If a negative, sharp in one facial plane, has to be printed from so as to give the best effect, the correct proceeding is to interpose between it and the sensitive paper a more or less thin transparent film, such as a sheet of gelatine or translucent paper, and allow it to remain over during one-half of the printing operation, then dextrously removing it and allowing the remainder of the printing to proceed with the paper in absolute contact with the negative. This ensures the requisite sharpness coupled with an elimination of those asperities of the skin which are so offensive.

Sharpness, so necessary and desirable in small portraits, is far from being so in large heads, and other expedients besides that

just mentioned have been resorted to in order to lower it, including that of Mr. Kurtz, who invented a system of interposing between the sitter and the camera a species of gridiron of lighted gas burners to disturb crisp definition by ascending currents of rarified air.

Thoroughly recognizing the value of the diaphragm as a means of obtaining all the depth of definition that may be desired and as a means of equalizing the sharpness over all the planes of the face, while this affords a means of ensuring that no one part shall excel another in sharpness, it also ensures that intensity of definition against which I now raise a plea. What then are the best means by which softness—in the optical sense—and a suitable degree of equality are to be obtained?

The lens for this purpose ought to have a certain amount of spherical aberration in virtue of which some of the rays transmitted from any part of the object are more or less certain to be focalized on the plate, although surrounded by an aureola caused by other rays which do not come to a focus on the same plane. In short, the focus of each portion is there; but, because of the nimbus surrounding it, it is less plainly picked out than if it were secured by a more perfectly corrected optical appliance. I could perhaps, make this plainer by means of a diagram, but I conceive it to be scarcely necessary.

To carry out this condition in the readiest and least expensive manner, it is only necessary that the photographer employ the *front* lens of his portrait combination, taking care, however, that it is transferred to the position occupied by the back lens, and in such a way that its convex surface is next to the ground glass. By this arrangement, and with no stop, the definition will be too imperfect to be of photographic use; but by commencing with the largest diaphragm and proceeding tentatively downwards the lowest degree of softness, coupled with any reasonable amount of definition, will eventually be obtained. If too small a stop be employed, the sharpness will be increased in too great a degree for the special purpose I am now aiming at.

The slowness consequent upon the lengthened focus and the stop is in some measure counterbalanced by getting rid of the back combination with its four reflecting surfaces, and the necessary exposure is much shorter than would have been primarily anticipated.

PRINTING CLOUDS IN LANTERN SLIDES.

By F. Turner.

In selecting a subject to write upon for the ANNUAL, I feel almost at a loss, as everything about photography has been so thoroughly expounded by competent authorities that really, Mr. Editor, I scarcely expect that anything I may write will deserve recognition.

After rummaging my brains awhile, I have hit upon a subject that is scarcely threadbare yet, I think, that is, "Printing Clouds in Lantern Slides." I have seen articles on the subject in various photo papers and instruction books, but in most instances the amount of unnecessary work advised was such as to make the operation a tedious and troublesome process, besides adding difficulties in the way of success. In the following I purpose giving a mode of operation which, in my hands, has proved satisfactory.

In my dark room window I have an aperture corresponding to size of negative, from which the transparency is to be made. Also a bench or table about four feet long by eighteen inches wide. In the center of this bench is a slit lengthwise to about six inches from each end; through this slit goes the tripod screen and holds the camera central to the negative, which we will suppose is a landscape one and has been placed in the above mentioned aperture, with a piece of ground glass behind it; the tripod screw fitting loosely allows of the camera being moved backward or forward, till the desired size and focus is obtained; then screw tight, stop and cap the lens; then take a piece of brown (or any opaque stiffish) paper and tear it nicely to shape of sky portion of the negative, over which hold during the exposure. giving a slight up and down movement if the negative is thin so as to avoid making a harsh line.

This masking of the negative I have found to be essential, as all good negatives, however dense the sky may be, are too thin to go unmasked if clouds are to be printed in effectively. The exposure made, cap the lens, then take another piece of the opaque paper and tear it the desired shape to cover the landscape, and with a couple of drawing pins fasten it over the negative at the proper height on a level with the horizon; now take out the negative and replace with a cloud one previously selected, carefully remove the drawing pins so as not to alter position of

the mask and hold it with the right hand, and with the left uncap the lens, move the mask up and down slightly to avoid making a line.

To those unaccustomed to printing clouds, either in transparencies or prints, a hint as to exposure seems necessary, as clouds require printing much weaker than the view. As a rule I have found about five seconds sufficient for the exposure of a cloud negative of about the same density as a landscape one that required twenty-five to thirty seconds.

Those who may have experienced failure in this important part of photography, will find the above method to give satisfactory results, which wholly consists in vignetting the sky out and vignetting the clouds in. Several details of minor importance might have been given, but these will naturally suggest themselves to the operator as he proceeds.

Before concluding, I must not omit to give what has proved with me a certain remedy in case of the clouds appearing so black and heavy in the finished transparency as to spoil the effect and render the slide unfit for exhibition. In such a case I take a solution of hypo of the strength that is used for fixing negatives and mix with it a very small quantity of a solution of ferricyanide of potassium. When mixed, it should be the color of a lemon; then with a flat camel hair brush apply to the parts requiring reduction, moving equally all over. When sufficiently reduced, rinse well in water or under the tap; then with a damp cloth carefully wipe or dab off all the superfluous water and examine closely to see if the parts have been reduced evenly; small portions may appear that want a little further reduction; if so take a camel hair pencil and apply it carefully so as not to intrude upon those parts sufficiently reduced; when the reduction is complete wash thoroughly as a negative after fixing. I may say that I have transparencies that have gained me honors, which before this treatment, were thrown aside as worthless.

THE DARK ROOM.

By Professor Albert H. Tuttle.

The writer has recently had occasion to plan and arrange a dark room for the photographic work of the new Biological Laboratory of the University of Virginia. The result may perhaps

be interesting, and possibly suggestive, at least to beginners in photography.

In drawing the ground plan of one of the floors of the building a room fourteen feet square was set off for this purpose, this amount of floor space in a room with a high ceiling giving a volume of air sufficient to enable me to work a long time with comfort without artificial ventilation, though the room is so placed that the latter can be readily provided for if necessary. The wall between the dark room and an adjacent room is pierced with three openings, the room being intended to accommodate that number of persons at a time if desired. These openings are ten inches wide by twenty inches high, and are two feet apart. Their lower edges are four feet and two inches from the floor. Along the wall of the adjacent room a gas pipe is carried, with a branch before each opening fitted with a six-foot lava tip; the light is therefore practically uniform. The gas is lighted before entering the room, and extinguished on leaving it; when all three lights are burning it is evidence that the room is full.

The openings are each glazed on the outside with orange and on the inside with ruby glass. The inner glass is mounted in a sash which swings to one side, enabling the use of the orange glass alone when that is desirable, as for wet plate and transparency work or work with bromide paper of less sensitiveness. On the other hand, a bead around the casing between the two glazings permits the introduction of a light frame on which yellow tissue paper is stretched, whenever extra precautions are needed with very sensitive plates. To the upper border of the sash which carries the ruby glass is hinged a flap of light pine as wide and as long as the sash; when swung out and supported by a prop, it enables the worker to see the whole pan while his eyes are completely shaded. The flap hangs vertically against the sash when the prop is turned aside, and is pierced at a point directly opposite the gas jet without by an opening three inches square, which may be closed by a sliding shutter, and is, as will be readily understood, intended to facilitate the examination of the negative by transmitted light.

The principles involved in the illuminating arrangement above described (which is not so complicated as is, I fear, my description of it) are, that while the plate is under observation in the pan it should be illuminated by a large use of weak light, as little as possible of which should reach the observer's eyes

unnecessarily, and that while it is being inspected by transmitted light, only that part of the plate should be illuminated which is under inspection and all else should be as dark as possible. Finally, in order to insure uniformity of work from day to day, the light should be the same at all times, for this reason all arrangements for modifying the gas flame from within were ejected after careful consideration.

Just beneath the illuminating windows, its upper surface being four feet from the floor, runs a shelf fifteen inches wide, on which the pan is placed for ordinary work. Four inches below it is a second shelf eighteen inches wide; this second shelf or sub-shelf, I regard, after two years' use elsewhere, as invaluable; during prolonged treatment with dilute developer, or in any process that takes time, the pan can be placed there and rocked or otherwise manipulated in what is practically total darkness, while it can be brought to the upper shelf for examination in an instant and as quickly replaced. Laying a board on the pan is a poor substitute for it. The space between the shelves is partitioned off for each window, and a listed strip fitting the opening renders each compartment a miniature dark chamber when necessary.

Ten inches below the sub-shelf is a sink twenty inches wide and fourteen inches deep. This is divided into three compartments, each with its waste pipe fitted with an overflow plug. Along the under surface of the sub-shelf, six inches from its edge, runs a water pipe with a short straight stopcock on the middle of each compartment, whose tip is guarded by a short piece of soft rubber tubing. The plate can thus be brought in an instant under a rinsing stream. In one corner of the sink stands an old-fashioned wet plate bath for hypo, and in another a washing box, the top of each being two inches above the top of the overflow plug. This arrangement has another advantage besides convenience of access. The wash box being connected, and the stream turned on, the overflow plug being in place, both hypo bath and box stand immersed in water whose temperature while running freely rarely rises, even on the hottest of Summer days above sixty degrees, a wrinkle which saves a good many frills.

The room has a single window on its northern side. In addition to a light tight shutter covering the whole window, each pane of glass is covered with nonactinic paper save one, which is replaced with a board pierced by an eight by ten opening and

having on its inner side an arrangement for supporting an enlarging camera at such an angle that the negative is turned toward the clear sky; an easel built at a corresponding angle supports a drawing board, to which may be pinned paper for bromide enlargements or drawing paper for temporary sketches with pencil or otherwise. The support for the enlarging camera may be replaced by a similar but longer one (with legs reaching to the floor) for a copying camera, to be used for enlarging or reducing to scale, making transparencies for the lantern, etc.

An entry way with two doors permits workers to go in and out without interfering with each other.

The dark room which I have described is of course suited just as it is only to those who use it, to whom, doubtless, many improvements will suggest themselves in time; but the principles involved in its construction, none of which necessarily involve any great expense, are possibly worth considering by any one who enters *de novo* upon the arrangement of a dark room. They are the use of a uniform artificial light, placed outside the room to avoid heat and vitiation of the air; the use of two large panes of glass instead of one small one in the window, and of such other appliances as will enable the worker to have the plate under the most favorable illumination possible while examining it, whether by reflected or transmitted light, and as completely protected from *all* light as possible during the intervals; provisions for the quick and convenient rinsing and fixing of the plate at the right instant and for a safe and thorough washing afterwards. To these should be added the choice of as large and airy a room as possible for the sake of health and comfort, and such special adaptations as suit the individual needs of the worker.

THE OXALATE DEVELOPER.

By G. W. Valentine, Southampton,

To those that do their own enlarging and printing on bromide paper, and when using the Ferrous Oxalate Developer in connection therewith, complain that they cannot always get successful results, let me advise them to try my plan when printing by gaslight, to give a fairly long exposure, say one to three minutes at twelve inches from a large flame burner, according to density

of negative, and then *develop the print face downwards.* Try it and you will be surprised at the very superior results. If too long an exposure is found to have been given, restrain with one or two minims of a saturated solution of potassium bromide.

PHOTOGRAPHY WITHOUT A LENS.

By Leon Vidal, Paris.

Much has already been said about this mode of reproduction. A means to do without a lens could not but be of interest, and in fact, many serious experimenters have investigated this method to ascertain at least of what utility it could be. Its great inconvenience is that it does not admit an exposure sufficiently short to reproduce objects in motion. But it is not a long time ago that this was true even with lenses. There is no cause, therefore, to be much frightened by this length of exposure when making use of photography without a lens. The advantages should be first considered, to indicate the *desiderata,* leaving to the future the realization of them. We have the conviction that it will take charge of it.

The advantages, as is well known, consist in the suppression of every lens; which is certainly something, for it costs infinitely less to buy one or several holes than to pay for a lens even of an inferior quality. On the other hand, it should be remarked, that the use of holes of small diameter does not entirely dispense with lenses; but with these simple openings one produces effects which would be obtained only by changing position or by the use of a series of lenses of various foci and of different angles of view. Another serious advantage is the freedom from distortion and defective perspective.

Something which has also its charm is the immense depth of focus—if we can thus express ourselves—at our disposal; thus objects are in focus for every variation of distance, or very nearly so.

We say *in focus,* but one knows that the sharpness, although sufficient for photographs of documents, leaves much to be desired when compared to that obtained with lenses. It is well, therefore, not to ask too much from this side. However, landscapes and buildings thus reproduced have a great softness,

something which although blurred (*flou*) is not the less agreeable to the eye, and of an effect really artistic.

It is well understood that this mode of reproduction cannot be applied to subjects admitting an absolute sharpness, and that it should be limited to take views of landscapes, buildings, etc.; also to reproduce engravings, paintings and designs of which one desires to have only an idea of the composition, of the *ensemble*, and not an exact copy.

An engraving, for example, when reduced, is reproduced without the cross lines; an image thus shaded by lines happens to be rendered with a *modelé* in gradation of tints (*modelé contina*). It is, therefore, in certain cases a process of transformation which can have its utility.

Of all that has just been said it results that photography without a lens, taking its inconveniences into account, can render some service; the most serious of its defects is to require long exposures. At least it is necessary to ascertain the times of exposure required according to the focal lengths, the diameter of the opening and the luminous intensity. It is this to which the amateurs do not sufficiently apply themselves. They make one or two unsuccessful essays and they are discouraged. It is because, considering the small opening at our disposal, we must know that the duration of the exposure is excessively longer than with lenses.

For example, we can, indoor, reproduce an engraving in one minute with a lens having a diaphram of 10 millimeters and a focal length of 40 centimeters. If, in lieu of the lens, we employ a small opening of $\frac{3}{10}$ of a millimeter, everything being equal, is it not true that to know the duration of the exposure, it suffices to compare the surfaces of the two openings which admit the reflected rays? Well! the square of the diameter of the diaphram is 10 c. m. x 10 c. m. = 100 c. m. square; now, if we reduce these 100 square centimeters into tenths, we find that one square centimeter contains 100 square millimeters of which it results that 100 square c. m. equal 100 times 100 square milimeters, or 10,000 square millimeters. On the other hand, the square of the diameter of our small opening of three-tenths of a millimeter is nine-tenths, consequently we find the ratio between 9 and 10,000 tenths, it is 1111, which means that with the simple hole of three-tenths of a millimeter one must expose 1111 more than with the diaphram of 10 centimeters; hence, if with the latter, an

exposure of one minute was necessary to obtain a good proof, one should expose 18½ hours with the hole of three-tenths of a millimeter.

This demonstration proves that if the above calculation is not made, the desired results will not be obtained; one will expose one hour, two, three, six hours, but the idea will not occur that one must expose more than eighteen hours.

To avoid such groping in the dark (*tatonnements*), we think that a table of calculations of the various times of exposure should be made in order to know at once under what conditions to operate. The calculation cannot be very long if we consider that in photography without lenses there are but five usual openings from three to $\frac{7}{10}$ of a miillmeter in passing by those of $\frac{4}{10}$, $\frac{5}{10}$ and $\frac{6}{10}$. The opening of $\frac{7}{10}$ requires now a focal distance (so to speak) of 60 centimeters.

The openings being greater as the focal distance increases, a kind of compensation occurs as to the duration of the exposure, which is sensibly the same for every focal length, provided the opening which corresponds be employed.

As a conclusion to this paper we will say that, while waiting for the day when, thanks (*grâu*) to the greater sensitiveness of the plates, we will be able to take instantaneous pictures with such small openings, it is advisable to have recourse to photography without a lens only when knowing how to determine the conditions under which one operates.

In such cases a table of the times of exposure permits of ascertaining whether the operation can be undertaken or whether the conditions should be modified in such a manner in order to have time to make the desired reproduction.

We have undertaken this work, and we think it will be useful to those who will experiment with this method, which is more that of the future than that of the present, but which can now be employed with advantage and with interest.

DEPTH OF FOCUS AND ANGLE OF VIEW.

By Rev. Clarence E. Woodman, Ph. D.

There seems to be much uncertainty in the mind of the average non-scientific amateur about the precise meaning of the

above mysterious terms; and it is to be feared that this uncertainty is fostered and encouraged by the occasional absurd and contradictory statements put forth by lens makers' catalogues.

Every now and then there is announced a brand new and entirely original combination of brass and glass, to christen which the dead languages are laid under heavy subsidies, and which, according to catalogue description, is the most rapid lens made, working with full opening, giving perfect flatness of field, covering the plate sharp to the edges, having a miraculous depth of focus, and including an angle of 100° at the very least.

Now, it is quite possible to construct a lens—and every good optician does construct such—which will work with an opening as large as

$$\frac{f}{8} \text{ or even } \frac{f}{6}$$

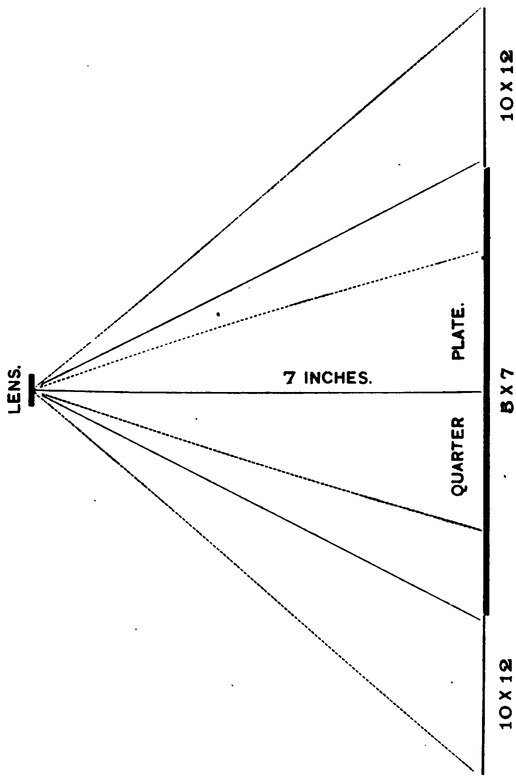
covering well the plate for which it is designed. But such a lens will *not* possess "depth of focus" with that opening, and will *not* include a wide angle. It is also quite possible to make lenses having great depth of focus, and including angles of over 90°. But such lenses will *not* work with full opening, nor will they work with lightning speed.

There is nothing at all mysterious about the terms "depth of focus" and "angle of view." They are not dependent upon any occult principle in the glass of the lens, or upon the name thereof—however sesquipedalian. Under the same conditions all *good* lenses, *i. e.*, those made by respectable opticians, behave in this regard in precisely the same manner.

I. Angle of View depends solely upon *the ratio between the focal length of the lens and the size of the plate used.*

With lenses of the same equivalent focus, whether they are called Rapid Rectilinear, Rapid Symmetrical, Rapid Hemispherical, Wide Angle, Extreme Angle, Aplanatic, Homolographic, Panorthorscopic, Orthopanactinic, or any other combination of the Greek alphabet you choose, a given plate *will subtend the same angle.*

This is shown clearly in the accompanying diagram (drawn to



scale). The lens is supposed to have a solar focus of 7 inches, and the various angles which this lens would include upon a quarter plate, a 5 x 7, and a 10 x 12 plate respectively, are indicated by the converging lines: a dark line for the 5 x 7, and dotted lines for the two others. The application of an ordinary horn protractor will at once show the angle included in every instance.

Of course, every lens of 7 inches focus will not cover as large a plate as 10 x 12; in fact very few will. But that does not affect the question. Given *a plate which the lenses will cover*, then the angle is always the same for the same focal length.

The accurate expression of this ratio between plate and focal length of lens, upon which the view angle depends, may be of interest to the mathematical amateur. It is as follows: *Divide half the base line of the plate by the equivalent focus of the lens. The quotient is the tangent of half the included angle.*

II. DEPTH OF FOCUS, as popularly understood, depends solely upon *the ratio between the focal length of the lens and its working aperture.* An opening of

$$\frac{f}{20}$$

for instance, giving practically the same "depth" in lenses of every form and name. It should be borne in mind that no lens can be made—with our present tools, at least—which will give an accurately sharp focus for all rays. From the necessities of the case, lenses have to be ground to spherical surfaces, and no spherical surface can fully meet all optical requirements. A central ray and a single *ring* of rays can be brought to one and the same sharp focus by our lenses; but no *two* rings of rays can. So that "focus" is, after all, only a sort of *juste milieu*—a splitting of the difference—an optical compromise. Ordinarily speaking, then, and without going into mathematical subtleties (which would be out of place in a popular article), it can be easily proved by experiment that the more the working aperture of any lens is reduced, the greater becomes the distance through which the plate can be moved without perceptibly affecting the sharpness of the image; in other words, the greater becomes the "depth of focus." And when, by successive diminutions, a point is reached when the aperture is a mere pinhole, there is no definite focal plane at all. In fact, the lens can then be dispensed with altogether, and a picture made by means of the aperture alone. The plate is approximately in focus at any distance, its position determining the *size* of the object only, and not its definition.

What then is the best form of lens for all-around use? This is very much like asking who has the best wife? The writer has his own preference, of course (in *lenses*, that is to say); and

that is a wide angle doublet, of a focal length not less than the base line of the plate used. For the following reasons: 1°. It is a lens of compact shape and little weight. 2°. The central stops are permanently attached to the lens—being apertures in a rotating plate—and are therefore never missing when needed. 3°. The largest working opening

$$\text{about } \frac{f}{15}$$

gives good depth of focus, and is quite large enough for all ordinary instantaneous work on our modern rapid plates. There is really no use for extra large lens openings in these days of lightning emulsions, except for certain special purposes (in protraiture, for example, where depth of focus is rather a detriment than otherwise). 4°. Such a lens can be used on much larger plates, when desired—as in photographing interiors —giving many different angles of view. The writer's favorite lens is a Dallmeyer wide-angle rectilinear, of 7 inches equivalent focus, used ordinarily on a 5 x 7 plate. On this plate the angle included is 53°. With the smallest stop,

$$\frac{f}{44},$$

this lens covers a 10 x 12 plate, giving an angle of 81°. On a quarter plate the angle would be 33°; on a 4 x 5, 39°; on a half-plate, 50°; on a 5 x 8, 59°; on a whole plate, 62°; and on an 8 x 10, 71°. The range of view-angles, therefore, with such a lens is from 33° to 81°.

COLLODION EMULSION FOR LANTERN SLIDES AND TRANSPARENCIES.

By T. C. Roche.

One of the very best mediums I have ever used for the above purpose has been a collodion emulsion, compounded as follows:

Attwood's alcohol	8 ozs.
Ether	8 "
Anthony's special cotton	128 grs.
Bromide of ammonia	128 "
Nitrate of silver	240 "

First add four ounces of the alcohol to the ether, in a clean bottle, then the bromide of ammonia, and shake until dissolved. Next add the cotton and shake well. Grind the silver nitrate to a fine powder in a clean mortar, transfer to a small wide mouth bottle and add a few drops of water, just enough to moisten it, then add some of the alcohol which has been reserved. Now place the bottle of silver solution in a water bath and raise the temperature until the alcohol boils, when it will take up the silver nitrate; while in this state you add it to the bromized collodion, shaking well after each addition. Keep adding the silver and heating the alcohol until your silver is all used up.

This is of course done in the dark room. The emulsion is now allowed to ripen for at least twenty-four hours, with an occasionally good shaking up. After this time it must be tested for free silver. In the dark room pour a drop or two of the emulsion on a piece of glass, bring this out in the light, and allow one or two drops of a ten grain solution of bichromate of potash in water to fall on the portion you wish to test. It will turn blood red, showing silver in excess; or you can test with a fifteen grain solution of ordinary protosulphate of iron, which will cause it to turn black.

Emulsion containing free silver will fog badly under the alkaline developer, therefore the best remedy is to take up this free silver by the addition, carefully, of chloride of cobalt dissolved in alcohol, the strength is immaterial, although I prefer a strong solution. Commence by adding ten or fifteen drops, then after shaking test as above. When the free silver is all converted, the iron sulphate will show no result on the plate.

To use the above emulsion, wash your glass clean and albumenize when dry. The plate is coated with the emulsion in an ordinary yellow light. After the film has set, which it will do in about a minute, the plate must be washed in clean water under the tap or rocked in a dish until the greasy lines disappear. It is now ready for exposure, unless you wish to use them dry; in that case you have to flow them with a preservative and put away to dry (plain coffee, with a few grains of gum arabic added, is a good preservative). With a copying camera I prefer to use the plate wet. Exposure from fifteen to thirty seconds, with quarter-inch stop. Any of the alkaline developers will work with the addition of bromide.

With ferrous oxalate the picture flashes out instantly, but has

no strength; although it can be easily built up by redeveloping with acid pyro and silver. Previous to doing this, however, the plate should be well washed and weak acetic acid flowed over it. Fix in hypo and wash well. You can now tone to any desired color you wish, although they very seldom require it. Lantern slides do not require so much density or body as transparencies for the window. I hope this article will cause some to try this simple process; they will be pleased with the results.

NOTES ON APPARATUS AND BOOKS.

By the English Editor.

[*W. Jerome Harrison, F. G. S., 356 Lodge Road, Hockley, Birmingham.*]

All the following notes have been written after a careful study, examination, or test of the articles named. In the coming year we would ask those firms who desire that we should describe any novelties that they may produce to forward them to us *in good time.*

Hazell, Watson & Viney, Ld., 52 Long Acre., W. C. We have received from this firm a "Dictionary of Photography," by E. J. Wall, which is a very useful book.

Iliffe & Co., Vicar Lane, Coventry. During the past year this enterprising firm has issued the "*Science and Practice of Photography,*" by Chapman Jones; two "*Indispensable Handbooks*"—one for photography generally, the other for the lantern; and an introductory text-book, "*Photography for All,*" by the writer of these notes. And all this in addition to starting a successful penny weekly entitled "*Photography.*" The work does Mr. Sturmey and his coadjutors great credit.

R. W. Thomas & Co., 10 Pall-Mall, London. Having used large quantities of "Thomas's Plates" we can pronounce them first rate. The slow "thickly coated landscape plates" are the best for a beginner, who should give a full exposure when using them. The hydroquinone and caustic soda developer lately introduced by this firm is a great favorite with us. The manager of the firm—Mr. J. T. Sandell—is an excellent chemist; and he is, we believe, almost the only man who has been able to use successfully and continuously, and on a large scale, the "separator" in the manufacture of gelatine emulsion.

Holmes, Sadler & Holmes, 24 Southall St., Manchester. The specimens of "opaline" materials which we have received from this firm are of excellent quality. We know of no more pleasing or easy way of mounting and exhibiting a print than by making it into an "opaline."

John Harmer, of Littlehampton. Mr. Harmer's specialty is the production of enlarged negatives. Mr. Harmer's skill enables him to effect, in most cases, a considerable improvement of the negative in the process of enlarging. We recommend those who carry small cameras to give him a trial.

Sampson, Low & Co., Fleet Street, E. C. The hundredth edition of that grand old book "The Compleat Angler" by Izaak Walton and Charles Cotton," has a special interest for photographers, for Dr. Emerson and Mr. George Bankart (two of our foremost amateurs) have contributed to it fifty-two most charming photographs (reproduced by that finest of processes—photogravure) of scenes on the rivers Lea, Dove, etc. Of the *edition de luxe* (price ten guineas) only 250 copies have been printed; and of the *demy quarto edition* (price five guineas) only 500. Each edition is in two volumes, and all the American copies have been secured by Messrs. Dodd, Mead & Co., of New York.

Dr. Emerson's new book, "*Naturalistic Photography,*" is also published by Sampson, Low & Co. It is written in the most forcible style, and has already been fiercely assailed by the photographic press. Notwithstanding this we find much in the book that is original and that will do good. Dr. Emerson's ideas agree in the main with those held by the artists of the "Impressionist" school, and if his work only succeeds in making the average photographer understand that he must study art principles, and go to painters and paintings for information, he will not have written in vain. We are glad to hear that a second edition of this book has already been called for.

Rendall & Co., Irving St., Birmingham. Cameras and tripods distinguished for strength, simplicity andcheapness. The "Orderly Cupboard" is a neat contrivance, in dark polished oak, with lock and key, and is very suitable for containing bottles with chemicals, etc.

Dallmeyer, J. H., 25 Newman St., Oxford St., London. We recently had the honor, at the request of Mr. Leslie Stephen, to write some account of the late J. H. Dallmeyer for the *Diction-*

ary of National Biography. No one who has used a Dallmeyer lens can fail to admire the *work*, but those who knew the founder of the firm equally admired the *man*. The reputation of the firm is safe in the hands of Mr. T. R. Dallmeyer, "the son of Dallmeyer and the nephew of Ross." The Dallmeyer Rapid Rectilinear Lens, which has been sent to us to examine, is a magnificent specimen of a high class optical instrument.

For some years prior to the death of Mr. J. H. Dallmeyer, the entire charge and practical working of the establishment was in the hands of his son, Mr. Thos. R. Dallmeyer.

Photophane Co., 846 Old Kent Rd., London. (Manager, Mr. A. D. Edward). Photophane is a photo-mechanical process allied (but superior to), collotype. We need only ask readers to examine the specimen of the process given in the present and in the last volume of the ANNUAL, to convince them of the beautiful and permanent results which this process can produce.

Joseph Levi & Co., 40 Furnival St., Holborn, London. Messrs. Levi supply the trade only with every variety of optical and photographic apparatus, and they have long held a high and well deserved reputation. The "Leviathan" Gauze Fabric Folding Photographic Lamp, which we have received from this firm, is the only lamp we know which is equally well fitted for use at home or on tour. A 7 × 5 Rectilinear Lens is of good quality, and is fitted with an iris diaphragm, the workmanship of which leaves nothing to be desired.

C. C. Vevers, Horsforth, Leeds. We have tried Mr. Vever's Portable Distillery with complete success, and as we strongly recommend the use of *boiled distilled water* for making up developers and toning baths, we consider this portable still a good thing. We have also tried, with pleasure, a simple and very cheap but effective flash light, and a combined minim-measure and dropping-bottle.

J. Place, 13 Bull St., Birmingham. Mr. Place's lantern work (both oil and lime light) we have long used and know to be excellent. His simple shutter is invariably used by us instead of a lens cap.

A. R. Wormald, Sutton, Surrey. Besides compiling an "Index of Photographic Exposure," which is, to our knowledge, largely used, Mr. Wormald has lately introduced a capital enlarging camera—the "Al Fresco," and an equally good lantern

camera, the "Archon"—for making slides by reduction from larger negatives.

S. Fry & Co., Kingston-on-Thames. (London office, 5 Chandos St., Charing Cross). Some months back we had the pleasure of making a careful examination of the extensive works of this firm at Kingston, and in every respect they do credit to the powers of organization possessed by the resident manager, Mr. S. Herbert Fry. We have also, from time to time, tested the various plates manufactured by Messrs. Fry, and to say that they have steadily improved is no mean compliment, for they were of good quality at the first.

W. J. Smith, Broad St. corner Birmingham. We have known Mr. Smith's work for several years, but the "Simplisimus" Camera, which is now his standard article, shows that he has kept pace with the times. It is strong, light and very cheap.

T. Manson, 37 Highgate, Kendal. Mr. Manson has lately published the "Amateur Photographer's Ready Reckoner," which is a very complete set of exposure tables by a gentleman who styles himself "Viæ."

Harris, Son & Co., Portrait Painters, 88 High St., Merthyr. We have seen several specimens of the work of this firm (beside those which they have especially sent us for criticism) which prove that they are capable of turning out good work in varied styles.

R. & J. Beck, 68 Cornhill, E. C. Nearly a year ago we had the pleasure of making a careful inspection of the London works of this well known firm. Lenses are, of course, their specialty, and they were the first firm to manufacture the iris diaphragm, which they used in their microscope more than thirty years ago. But a great deal of wood work is also turned out, including cameras (there is a splendid detective camera made here), shutters, etc.

R. Abraham, 81 Aldersgate St., E. C. This firm dealsl argely in all varieties of photographic goods, but we were specially struck with their detective camera (Kerr's patent), which contains twelve plates that can be exposed in rotation in less than a minute, and this by simply moving a small knob.

C. Hethton Lewis, Chiara Studio, 60 Lansdowne St., Hove, Brighton. Mr. Lewis is not only a good photogragher, but a capital teacher of the art. He has also invented several useful pieces of asparatus; and from a careful trial we can highly

recommend the hydroquinone developer, which he was one of the first to send out.

W. Watson & Sons, 313 High Holborn, London. London cabinet work has always been famous, and it is to be seen at its best in Messrs. Watson's large workshops in "Fulwood's Rents" (a locality immortalized by Dickens), just opposite their shop in High Holborn. Here the normal number made of each size of dark slide is 500 at a time; while such objects as enlarging lanterns with sixteen-inch condensers are not uncommon. The firm's specialty for 1889 is their "Acme" camera, which they cannot manufacture fast enough to meet their orders. The firm supplies every article used in photography.

Lindsay Hemery, Hanover Studios, Peckham, S. E. Mr. Hemery has long been known as a producer of good-all-around work in photographic printing, retouching, etc. Some specimens of his "Easter Cards" now before us are extremely good.

TABLES.

TABLE OF THE ELEMENTS:

THEIR SYMBOLS, ATOMIC WEIGHTS, AND EQUIVALENTS.

Compiled by A. H. Elliott, Ph.D., from Watts' "Dictionary of Chemistry," 1888.

	Symbol.	Atomic Weight.	Equivalent.		Symbol.	Atomic Weight.	Equivalent.
Aluminium	Al	27.02	9.007	Mercury	Hg	199.8	99 9
Antimony	Sb	120.	40.	Molybdenum	Mo	95 8	19 16
Arsenic	As	74.9	24.97	Nickel	Ni	58.6	29.3
Barium	Ba	136.8	68.4	Niobium	Nb	94.	31.33
Beryllium	Be	9.08	4.54	Nitrogen	N	14.01	4.67
Bismuth	Bi	208.	69.33	Osmium	Os	193.	24.125
Boron	B	10.9	3.66	Oxygen	O	15.96	7 98
Bromine	Br	79.75	79.75	Palladium	Pd	106.2	26.55
Cadmium	Cd	112.	56.	Phosphorus	P	30.96	10.32
Cæsium	Cs	133.	132.7	Platinum	Pt	194.3	48.575
Calcium	Ca	39.9	19.95	Potassium	K	39.04	39.04
Carbon	C	11.97	2.99	Rhodium	Ro	104.	26.[illegible]
Cerium	Ce	139.9	46.6	Rubidium	Rb	85.2	85.2
Chlorine	Cl	35.37	35 37	Ruthenium	Ru	104.4	26.1
Chromium	Cr	52.4	26.2	Selenium	Se	78.8	39.4
Cobalt	Co	59	29.5	Silicon	Si	28.3	7.
Copper	Cu	63.2	31.6	Silver	Ag	107.66	107.6[illegible]
Didymium	Di	143 0	47.8	Sodium	Na	23.	23.
Erbium	E	165.9	55.3	Strontium	Sr	87.3	43.6[illegible]
Fluorine	F	19.1	19.1	Sulphur	S	31.98	15.99
Gallium	Ga	69.	23.	Tantalum	Ta	182.	60.67
Gold	Au	197.	65.66	Tellurium	Te	125.	62.5
Hydrogen	H	1.	1.	Thallium	Tl	203.64	203.64
Indium	In	113.4	37.8	Thorium	Th	231.87	57.97
Iodine	I	126.53	126.53	Tin	Sn	117.8	58.9
Iridium	Ir	192.5	48.125	Titanium	Ti	48.0	12.
Iron	Fe	55.9	27.95	Tungsten	W	183.6	30.6
Lanthanum	La	138.5	46.17	Uranium	U	240.	60.
Lead	Pb	206.4	103.2	Vanadium	V	51.2	17.07
Lithium	Li	7.01	7.01	Yttrium	Y	89.6	29.87
Magnesium	Mg	24.	12.	Zinc	Zn	65.2	32 6
Manganese	Mn	55.	27.5	Zirconium	Zr	90.	45.

NOTE.—The equivalent numbers are the smallest quantities of the element that unite with one part of hydrogen, eight parts of oxygen, or thirty-five parts of chlorine.

SILVER COMBINATIONS.

By A. H. Elliott, Ph.D.

One part of silver, or one part of silver nitrate, is equal to the following parts of other combinations:

	Silver Chloride.	Silver Bromide.	Silver Iodide.	Potassium Chloride.	Potassium Bromide.
Silver........	1.328	1.740	2.176	.690	1.102
Silver Nitrate	.844	1.106	1.382	.439	.701

	Potassium Iodide.	Sodium Chloride.	Sodium Bromide.	Sodium Iodide.	Ammonium Chloride.
Silver........	1.538	.541	.953	1.388	.495
Silver Nitrate	.971	.344	.606	.882	.315

	Ammonium Bromide.	Ammonium Iodide.	Cadmium Chloride.	Cadmium Bromide.	Cadmium Iodide.
Silver........	.907	1.342	1.363	1.776	2.211
Silver Nitrate	.576	.853	.538	.800	1.076

GOLD COMBINATIONS.

From Eder's Jahrbuch.

Pure Gold.	Dry Gold Chloride.	Gold Chloride Crystals.	Chloride of Gold and Potassium.	Chloride of Gold and Sodium.
1.	1.540	1.814	2.148	2.020
.649	1.	1.178	1.394	1.310
.554	.849	1.000	1.183	1.113
.465	.717	.844	1.	.941
.494	.762	.898	1.062	1.
.477	.735	.869	1.024	1.963
.374	.575	.679	.804	.757

SODIUM CARBONATE SOLUTIONS.

By Arthur H. Elliott, Ph. D.

Based upon the specific gravity table of Schiff in *Chemiker Kalender*. Temperature 23° C (73° F.). The gallon is that of the United States and contains 133.28 ounces of water. The ounce contains 437.5 grains. The first four columns give percentage by weight and weight in 100 volumes of the crystals (10 molecules water) and dry salt respectively.

Grams of Crystals in 100 grms.	Grams of Crystals in 100 c. c.	Grams of Dry Salt in 100 grms.	Grams of Dry Salt in 100 c. c.	Ounces Crystals in one gallon.	Grains Crystals in one fluid ounce.	Specific Gravity.	Degree Beaume.	Degree Twaddell.
50	60.2	18.53	22.31	80	262.5	1.204	24	40
45	53.2	16.67	19.75	71	232.	1.183	23	38
40	46.5	14.82	17.30	62	203.	1.162	20	32
35	40.0	12.97	14.83	53	174.5	1.141	18	28
30	33.6	11.12	12.32	45	147.	1.120	16	24
25	27.5	9.26	10.23	37	110.	1.099	13	20
20	21.6	7.41	8.00	29	94.5	1.079	10.5	16
15	15.9	5.56	5.83	21	69.5	1.059	8	12
10	10.4	3.70	3.85	14	45.5	1.039	5.4	8
5	5.1	1.85	1.86	7	22.3	1.019	2.7	4
2	2.0	.74	.76	3	8.8	1.008	1	1.4

POTASSIUM CARBONATE SOLUTIONS.

By Arthur H. Elliott, Ph. D.

Based upon the specific gravity table of Gerlach in *Chemiker Kalender*. Temperature 15° C. (60° F.). The gallon is that of the United States and contains 133.28 ounces of water. The ounce contains 437.5 grains. Dry potassium carbonate is understood in the figures given, and the first two columns give percentages by weight and weight in 100 volumes.

Grams in 100 grams.	Grams in 100 c. c.	Ounces in one gallon.	Grains in one fl. oz.	Specific Gravity.	Degree Beaume.	Degree Twaddell
52	81.6	109	357	1.570	53	114
50	77.2	103	338	1.544	51	108
45	66.6	89.	291	1.480	47	96
40	56.7	76.	248	1.419	43	84
35	47.5	63.	208	1.359	38	72
30	39.0	52.	171	1.301	33	58
25	31.1	41.5	137	1.246	29	51
20	23.8	32.	105	1.193	24	40
15	17.1	23.	75	1.142	18	28
10	10.9	14.5	44	1.093	12	18
5	5.2	7.	23	1.046	7	10
2	2.0	2.7	9	1.018	2.5	3

SATURATED SOLUTIONS.

The following solutions are saturated at 60° F. and the table gives the specific gravity, degrees Beaume and Twaddell, and the percentage of salt *by weight.*

	Specific Gravity.	Degree Beaume.	Degree Twaddell.	Percentage of Salt by Weight.
Alum (Ammonia) Crystallized..........	1.048	7	10	11
Potassium Carbonate Dry..............	1.571	52	112	52
" Oxalate......................	1.262	30	52	25
[illegible] rbonate (10 molecules water)..	1.199	24	40	49
" Hypos[illegible]phite (5 " ")..	1.210	25	41	58
" Sulphite (7 " ")..	1.197	24	40	35

SODIUM SULPHITE SOLUTIONS.

By Arthur H. Elliott, Ph. D.

Based upon experiments made specially for the construction of this table, temperature 15° C (60° F). The gallon is that of the United States and contains 133.28 ounces of water; the ounce contains 437.5 grains of water. Crystallized sodium sulphite with seven molecules of water is understood in the figures given, and the first two columns give percentage by weight and weight in 100 volumes.

Grams in 100 grams.	Grams in 100 c. c.	Ounces in one gallon.	Grains in one fl. oz.	Specific Gravity.	Degree Beaume.	Degree Twaddell
35.1	42.0	54.2	184	1.1969	24	40
30	35.0	46.6	153	1.1675	21	34
25	28.5	38.0	122	1.1381	17	27
20	22.2	29.6	97	1.1087	11	17
15	16.2	21.6	61	1.0793	10.5	15
10	10.5	14.0	46	1.0499	7.0	10
5	5.1	6.8	22.3	1.0205	3.0	4
2	2.0	2.7	8.8	1.0100	2.0	2

ALCOHOL.

Specific Gravities of Mixtures of Different Proportions of Alcohol (s. g. .7932) and Water, by Weight and by Volume, at 14° R. (6.35° F.).—MEISSNER.

Parts of Alcohol	Parts of Water.	Specific Gravity of Mixture by Weight.	Specific Gravity of Mixture by Volume.	Parts of Alcohol	Parts of Water	Specific Gravity of Mixture by Weight.	Specific Gravity of Mixture by Volume.
100	0	0.7932	0.7932	49	51	0.9196	0.9324
99	1	0.796	0.7969	48	52	0.9219	0.9344
98	2	0.7988	0·8006	47	53	0.9242	0.9364
97	3	0.8016	0.8042	46	54	0.9264	0.9384
96	4	0.8045	0.8078	45	55	0.928	0.9404
95	5	0.8074	0.8114	44	56	0.9308	0.9424
94	6	0.8104	0.815	43	57	0.9329	0.9443
93	7	0.8135	0.8185	42	58	0.9350	0.9461
92	8	0.8166	0.8219	41	59	0.9371	0.9478
91	9	0.8196	0.8253	40	60	0.9391	0.9495
90	10	0.8225	0.8286	39	61	0.9410	0.9513
89	11	0.8252	0.8317	38	62	0.9429	0.9529
88	12	0.8279	0.8346	37	63	0.9448	0.9547
87	13	0.8304	0.8373	36	64	0.9467	0.9564
86	14	0.8329	0.840	35	65	0.9486	0.958
85	15	0.8353	0.8427	34	66	0.9505	0.9595
84	16	0.8376	0.8454	33	67	0.9524	0.9609
83	17	9.8399	0.8481	32	68	0.9543	0.9621
82	18	0.8422	0.8508	31	69	0.9561	0.9632
81	19	0.8446	0.8534	30	70	0.9578	0.9643
80	20	0.847	0.8561	29	71	0.9594	0.9654
79	21	0.8494	0.8596	28	72	0.9608	0.9665
78	22	0.8519	0.8616	27	73	0.9621	0 9676
77	23	0.8543	0.8642	26	74	0.9634	0.9688
76	24	0.8567	0.8668	25	76	0.9647	0.970
75	25	0.859	0.8695	24	76	0.966	0.9712
74	26	0·8613	0.8723	23	77	0.9673	0.9723
73	27	0.8635	0.8751	22	78	0.9686	0.9734
72	28	0.8657	0.8779	21	79	9.9699	0.9745
71	29	0.868	0.8806	20	80	0.9712	0·9756
70	30	0.8704	0.8833	19	81	0.9725	0·9766
69	31	0·8729	0.886	18	82	0.9738	0.9775
68	32	0.8755	0.8885	17	83	0.9751	0.9784
67	33	0.8781	0.891	16	84	0.9763	0.9793
66	34	0.8806	0.8934	15	85	0.9795	0.9803
65	35	0.8831	0.8958	14	86	0.9786	0.9813
64	36	0.8855	0.8982	13	87	0.9796	0.9823
63	37	0.8879	0.9096	12	88	0.9806	0.9834
62	38	0.8902	0.9029	11	89	0.9817	0.9846
61	39	0.8925	0.9052	10	90	0.9830	0.9859
60	40	0.8948	0.9075	9	91	0.9844	0.9873
59	41	0.8971	0.9098	8	92	0.9860	0·9888
58	42	0.8994	0.9121	7	93	0.9873	0.9901
57	43	0.9016	0.9145	6	94	0.9897	0.9915
56	44	0.9038	0.9168	5	95	0.9914	0.9929
55	45	0.9060	0.9191	4	96	0.9931	0.9943
54	46	0.9082	0.9124	3	97	0 9948	0.9657
53	47	0.9104	0.9237	2	98	0·9965	0.9971
52	48	0.9127	0.9159	1	99	0.9982	0.9985
51	49	0.915	0.9281	0	100	1.0000	1.0000
50	50	0.6173	0.9303	..	..	....	....

ACETIC ACID.

Quantities of crystallizable acid in mixtures of acetic acid and water of various densities at 15° C.

Parts of Crystallizable Acid in 100.	Specific Gravity.	Parts of Crystallizable Acid in 100.	Specific Gravity.	Parts of Crystallizable Acid in 100.	Specific Gravity.	Parts of Crystallizable Acid in 100.	Specific Gravity.
100	1.0553	75	1.0746	50	1.0615	25	1.0350
99	1.0580	74	1.0744	49	1.0607	24	1.0337
98	1.0604	73	1.0742	48	1.0598	23	1.0324
97	1.0625	72	1.0740	47	1.0589	22	1.0311
96	1.0644	71	1.0737	46	1.0580	21	1.0298
95	1.0660	70	1.0733	45	1.0571	20	1.0284
94	1.0674	69	1.0729	44	1.0562	19	1.0270
93	1.0686	68	1.0725	43	1.0552	18	1.0256
92	1.0696	67	1.0721	42	1.0543	17	1.0242
91	1.0705	66	1.0717	41	1.0533	16	1.0228
90	1.0713	65	1.0712	40	1.0523	15	1.0214
89	1.0720	64	1.0707	39	1.0513	14	1.0201
88	1.0726	63	1.0702	38	1.0502	13	1.0185
87	1.0731	62	1.0697	37	1.0492	12	1.0171
86	1.0736	61	1.0691	36	1.0481	11	1.0157
85	1.0739	60	1.0685	35	1.0470	10	1.0142
84	1.0742	59	1.0679	34	1.0459	9	1.0127
83	1.0744	58	1.0673	33	1.0447	8	1.0113
82	1.0746	57	1.0666	32	1.0436	7	1.0098
81	1.0747	56	1.0660	31	1.0424	6	1.0083
80	1.0748	55	1.0653	30	1.0412	5	1.0067
79	1.0748	54	1.0646	29	1.0400	4	1.0052
78	1.0748	53	1.0638	28	1.0388	3	1.0037
77	1.0748	52	1.0631	27	1.0375	2	1.0022
76	1.0747	51	1.0623	26	1.0363	1	1.0007

N. B.—The density of the mixture increases until nearly 25 % of water is present, after which it again decreases. Acetic acid is, therefore, better tested volumetrically with a standard solution of alkali.

SULPHUROUS ACID.

Quantities of anhydrous sulphurous acid in solutions of different densities.—F. AUTHON.

Specific Gravity	Anhydr'us Acid in 100.	Specific Gravity	Anhydr'us Acid in 100.	Specific Gravity	Anhydr'us Acid in 100.	Specific Gravity	Anhydr'us Acid in 100.
1.046	9.54	1.027	6.68	1.020	4.77	1.013	2.86
1.036	8.59	1.023	5.72	1.016	3.82	1.009	1.90
1.031	7.63	..	..	..	..	1.005	0.95

FREEZING MIXTURES.

The following mixtures will be found useful where ice is not readily obtainable:

	Ingredients.	Parts by Weight.	Temperature produced Starting at 10° C.	Diminution of Temperature.
1	Water	1	−16° C.	26° C.
	Nitrate of ammonia	1		
2	Water	16	−12°	22°
	Saltpetre	5		
	Chloride of ammonium (sal ammoniac)	5		
3	Water	1	−19°	29
	Nitrate of ammonia	1		
	Carbonate of soda	1		
4	Snow	5	..	20°
	Chloride of sodium	2	..	
5	Snow	1	..	45°
	Crystallized chloride of calcium	2	..	
6	Crystallized sulphate of soda	8	−20°	30°
	Hydrochloric acid	5		

PERCENTAGE OF REAL AMMONIA IN SOLUTIONS OF DIFFERENT DENSITIES AT 57.2° FAHRENHEIT OR 14° CENTIGRADE.—Carius.

Specific Gravity.	Percentage of ammonia.	Specific Gravity.	Percentage of ammonia.
0.8844	36.0	0.9314	18.0
0.8864	35.0	0.9347	17.0
0.8885	34.0	0.9380	16.0
0.8907	33.0	0.9414	15.0
0.8929	32.0	0.9449	14.0
0.8953	31.0	0.9484	13.0
0.8976	30.0	0.9520	12.0
0.9001	29.0	0.9556	11.0
0.9026	28.0	0.9593	10.0
0.9052	27.0	0.9631	9.0
0.9078	26.0	0.9670	8.0
0.9106	25.0	0.9709	7.0
0.9133	24.0	0.9749	6.0
0.9162	23.0	0.9790	5.0
0.9191	22.0	0.9831	4.0
0.9221	21.0	0.9873	3.0
0.9251	20.0	0.9915	2.0
0.9283	19.0	0.9959	1.0

ELSDEN'S TABLE OF POISONS AND ANTIDOTES.

	Poisons.	Remarks.	Characteristic Symptoms.	Antidotes.
Vegetable Acids.	OXALIC ACID, including POTASSIUM OXALATE	1 drachm is the smallest fatal dose known.	Hot burning sensation in throat and stomach; vomiting, cramps, and numbness.	Chalk, whiting, or magnesia suspended in water. Plaster or mortar can be used in emergency.
Caustic Alkalies.	AMMONIA, POTASH, SODA	Vapor of ammonia may cause inflammation of the lungs.	Swelling of tongue, mouth, and fauces; often followed by stricture of the œsophagus.	Vinegar and water.
Metallic Salts.	MERCURIC CHLORIDE	3 grains the smallest known fatal dose.	Acrid, metallic taste, constriction and burning in throat and stomach, followed by nausea and vomiting.	White and yolk of raw eggs with milk. In emergency, flour paste may be used.
	ACETATE OF LEAD	The sub-acetate is still more poisonous.	Constriction in the throat and at pit of stomach; crampy pains and stiffness of abdomen; blue line round the gums.	Sulphates of soda or magnesia. Emetic of sulphate of zinc.
	CYANIDE OF POTASSIUM	*a.* Taken internally, 3 grs. fatal.	Insensibility, slow gasping respiration, dilated pupils, and spasmodic closure of the jaws.	No certain remedy; cold affusion over the head and neck most efficacious.
		b. Applied to wounds and abrasures of the skin.	Smarting sensation.	Sulphate of iron should be applied immediately.
	BICHROMATE OF POTASSIUM.	*a.* Taken internally.	Irritant pain in stomach, and vomiting.	Emetics and magnesia, or chalk.
		b. Applied to slight abrasions of the skin.	Produces troublesome sores and ulcers.	
	NITRATE OF SILVER		Powerful irritant.	Common salt to be given immediately, followed by emetics.
Concentrated Mineral Acids.	NITRIC ACID	2 drachms have been fatal. Inhalation of the fumes has also been fatal.	Corrosion of windpipe, and violent inflammation.	Bicarbonate of soda, or carbonate of magnesia or chalk; plaster of the apartment beaten up in water.
	HYDROCHLORIC ACID	½ ounce has caused death.		
	SULPHURIC ACID	1 drachm has been fatal.		
	ACETIC ACID, concentrated, has as powerful an effect as the mineral acids.			
	IODINE	Variable in its action; 3 grains have been fatal.	Acrid taste, tightness about the throat, vomiting.	Vomiting should be encouraged, and gruel, arrow-root, and starch given freely.
	ETHER	When inhaled.	Effects similar to chloroform.	Cold affusion and artificial respiration.
	PYROGALLOL	2 grains sufficient to kill a dog	Resemble phosphorus poisoning.	No certain remedy. Speedy emetic desirable

TABLES FOR THE CONVERSION OF GRAMMES (OR CUBIC CENTIMETERS) INTO OUNCES AND GRAINS.

CONVERSION OF GRAMMES INTO GRAINS.

Grammes.	Grains.
1	15.43
2	30.86
3	46.29
4	61.73
5	77.16
6	92.59
7	108.03
8	123.46
9	138.89

CONVERSION OF GRAINS INTO GRAMMES.

Grains.	Grammes.
1	.0648
2	.1296
3	.1944
4	.2592
5	.3240
6	.3888
7	.4536
8	.5184
9	.5832

CONVERSION OF GRAMMES INTO TROY OUNCES.

Grammes.	Troy ounces.
1	.03215
2	.06430
3	.09645
4	.12860
5	.16075
6	.19290
7	.22505
8	.25720
9	.28935

CONVERSION OF GRAMMES INTO AVOIRDUPOIS OUNCES.

Grammes.	Avoirdupois ounces.
1	.03527
2	.07054
3	.10581
4	.14108
5	.17635
6	.21162
7	.24689
8	.28216
9	.31743

The above tables render the conversion of the weights in question a matter of great ease, the error introduced in the last decimal place being trivial.

The use of the tables will be best illustrated by an example. Supposing that it is desired to find the equivalent in grains of 324.51 grammes, we proceed by breaking up this number into the following series of constituent parts, and finding the grain-equivalent of each part from the table.

Portions of original number.	Equivalents in grains.
300.	4630.
20.	308.6
4.	61.73
.50	7.716
.01	.1524
	5008.1984

The required quantity is 5008.2 grains. The numbers taken from the table will, in most cases, require a change as regards the position of the decimal point; thus, to find the value of 300 grammes, one refers to the table and finds 46.30 given as the equivalent, and a mere shifting of the decimal point two places towards the right multiplies this by 100, or gives the required number. In a similar manner, by shifting the decimal place of 30.86 one place to the right we obtain the value in grains of 20 grammes; while the number 61.7 is taken from the table without alteration as the equivalent of 4 grammes. For .50 the table number must have its point shifted to the left, making it 7.716 instead of 77.16; and finally the value of .01 is obtained by shifting the point of 15.43 two places to the left.

The above operations are, in actual practice, performed with considerable speed, the required equivalents being written down one after the other on a scrap of paper, and then added up.

TABLES FOR THE SIMPLIFICATION OF EMULSION CALCULATIONS.

From British Journal of Photography Almanac.

With a view of simplifying the calculations involved in emulsion making, Mr. William Ackland has worked out some useful tables, which will enable even those most ignorant of chemical philosophy to calculate with ease and rapidity the proper quantities of silver or haloid salts in any formula. Even those who are able to perform the calculations in the recognized style will find their labors materially lightened by means of these tables, which should be kept in a convenient place for reference in every laboratory.

No. I.

	Equivalent weights.	Weight of $AgNO_3$ required to convert one grain of soluble haloid.	Weight of soluble haloid required to convert one grain $AgNO_3$	Weight of *silver* haloid produced by one grain of *soluble* haloid.	Weight of *soluble* haloid required to produce one grain of *silver* haloid.	Weight of silver haloid produced from one grain $AgNO_3$
Ammonium bromide ..	98.	1.734	,576	1.918	.521	
Potassium " ..	119,1	1.427	.700	1.578	.633	
Sodium " ..	103.	1.650	.606	1.825	.548	
Cadmium " com.	172.	.988	1.012	1:093	.915	1.106
" " anh.	136.	1.25	.800	1.382	.723	
Zinc " ..	112.1	1.509	.663	1.670	.600	
Ammonium chloride ..	53.5	3.177	.315	2.682	.373	.844
Sodium " ..	58.5	2.906	.344	2.453	.408	
Ammonium iodide ..	145.	1.172	.853	1.620	.617	
Potassium " ..	166.1	1.023	.977	1.415	.707	1.382
Sodium " ..	150.	1.133	.882	1.566	.638	
Cadmium " .	183.	.929	1.076	1.284	.778	

The principal bromides, chlorides, and iodides which are likely to be used in emulsions of either gelatine or collodion have been included in these tables. Table No. I. presents to the reader, without any mystification which may be involved in equivalents, the actual weights of haloid or silver, as the case may be, required to convert or combine with one grain of the other.

In order to test the utility of this table, let us suppose that it is desired to make (say) ten ounces of emulsion by a new formula, which, for the sake of showing the working of the table, we will write down as follows:

Bromide of potassium	150	grains.
Iodide of potassium	10	"
Chloride of ammonium	10	"
Gelatine	200	"

Now, we want to know how much silver nitrate should be employed in sensitizing this mixture. For this purpose we use the first column, in which we find against each haloid the exact quantity of silver nitrate required to fully decompose one grain. Taking, then, the figures we find in column No. 1 against the three salts in the above formula, and multiplying them by the number of grains of each used, we have the following sum:

$$\left.\begin{array}{ll} \text{Potassium bromide} \ldots\ldots & 150 \times 1.427 = 214. \\ \text{" iodide} \ldots\ldots & 10 \times 1.023 = 10.23 \\ \text{Chloride of ammonium} \ldots\ldots & 10 \times 3.177 = \underline{31.77} \end{array}\right\} \begin{array}{c}\text{Weight} \\ \text{silver nitrate} \\ \text{required.}\end{array}$$

or the total quantity of silver nitrate required for full conversion .... 256. grains.

No. II.

	Ammonium Bromide.	Potassium Bromide.	Sodium Bromide.	Cadmium Bromide (Coml.).	Cadmium Bromide (Anhyd.).	Zinc Bromide.	Ammonium Chloride.	Sodium Chloride.	Ammonium Iodide.	Potassium Iodide.	Sodium Iodide.	Cadmium Iodide.
Ammonium bromide.....	1	.823	.951	.57	.72	.87	1.832	1.675	.676	.59	.653	.535
Potassium "	1.215	1	1.156	.692	.876	1.058	2.226	2.036	.821	.717	.794	.651
Sodium "	1.051	.865	1	.599	.757	.915	1.925	1.761	.71	.62	.686	.563
Cadmium " com.	1.755	1.444	1.67	1	1.265	1.527	3.215	2.94	1.186	1.035	1.146	.94
" " anh.	1.387	1.141	1.32	.79	1	1.207	2.542	2.324	.938	.819	.906	.743
Zinc "	1.149	.945	1.093	.655	.828	1	2.104	1.925	.776	.678	.75	.615
Ammonium chloride.....	.546	.449	.519	.311	.393	.475	1	.914	.369	.322	.356	.292
Sodium "	.597	.491	.568	.34	.43	.519	1.093	1	.403	.352	.39	.319
Ammonium iodide	1.479	1.217	1.408	.843	1.066	1.287	2.712	2.478	1	.873	.966	.792
Potassium "	1.695	1.394	1.612	.965	1.221	1.475	3.104	2.839	1.145	1	1.107	.907
Sodium "	1.53	1.259	1.456	.872	1.103	1.332	2.803	2.564	1.034	.903	1	.819
Cadmium "	1.867	1.536	1.776	1.064	1.345	1.625	3.42	3.128	1.262	1.102	1.22	1

Table No. II. gives in separate columns the relative converting values of each of the soluble haloid salts in ordinary use, showing how much of any salt must be used to replace one grain of any other. In each column will be found a unit (printed in larger type) which represents one grain of the salt named at the head of the column; the other figures in the same column show the exact quantities of the other salts which must be used in lieu of a single grain of that particular haloid. Thus, taking the first column, which is headed "Ammonium Bromide," we find against ammonium bromide in the margin the figure 1, representing one grain of that salt. If we wish to know the relative converting power of potassium bromide, we take the number in the same column which stands against the latter salt in the margin, viz., 1.245; that is to say, 1.215 grain of potassium bromide will be required to do the same work as one.

DR. WOODMAN'S TABLE OF VIEW ANGLES.

DIVIDE THE BASE OF THE PLATE BY THE EQUIVALENT FOCUS OF THE LENS.

If the quotient is	The angle is	If the quotient is	The angle is	If the quotient is	The angle is
	Degrees.		Degrees.		Degrees.
.282	16	.748	41	1.3	66
.3	17	.768	42	1.32	67
.317	18	.788	43	1.36	68
.335	19	.808	44	1.375	69
.353	20	.828	45	1.4	70
.37	21	.849	46	1.427	71
.389	22	.87	47	1.45	72
.407	23	.89	48	1.48	73
.425	24	.911	49	1.5	74
.443	25	.933	50	1.53	75
.462	26	.954	51	1.56	76
.48	27	.975	52	1.59	77
.5	28	1.	53	1.62	78
.517	29	1.02	54	1.649	79
.536	30	1.041	55	1.678	80
.555	31	1.063	56	1.7	81
.573	32	1.086	57	1.739	82
.592	33	1.108	58	1.769	83
.611	34	1.132	59	1.8	84
.631	35	1.155	60	1.833	85
.65	36	1.178	61	1.865	86
.67	37	1.2	62	1.898	87
.689	38	1.225	63	1.931	88
.708	39	1.25	64	1.965	89
.728	40	1.274	65	2.	90

This Table has been calculated for the use of those who wish to know the precise *angle of view* included by any particular lens on a given size of plate. Its mode of use will be easily seen by inspection.

DR. SCOTT'S TABLES OF COMPARATIVE EXPOSURES.

The following table, compiled by Dr. J. A. Scott, shows the comparative value of daylight at different hours of the day and seasons of the year, and is intended for use in conjunction with that of Mr. W. K. Burton :

Table of Comparative Exposures.

Hour of Day. A.M.	Hour of Day. P.M.	June.	May, July.	April, Aug.	Mar. Sept.	Feb. Oct.	Jan. Nov.	Dec.
12		1	1	1¼	1½	2	3½	4
11	1	1	1	1¼	1½	2½	4	5
10	2	1	1	1¼	1¾	3	5	6
9	3	1	1¼	1½	2	4	*12	*16
8	4	1½	1½	2	3	*10	..	..
7	5	2	2½	3	*6	..	..	..
6	6	2½	*3	*6	..	..	..	..
5	7	*5	*6	..	..	..	..	..
4	8	*12	..	..	..	..	..	..

* The accuracy of these figures would be affected by a yellow sunset.

Mr. Burton's Table of Comparative Exposures (slightly altered).

	Sea and Sky.	Open Landscape.	Landscape and Foreground. — Buildings.	Heavy Foliage. Foreground. — Portrait out of Doors.	Portrait in Studio Light.	Portrait in Ordinary Room.	Under Trees. — Fairly Lighted Interiors.	Badly Lighted Interiors.
f/16	1/10 sec.	⅓ sec.	1 sec.	2 sec.	16 sec.	1 min.	2½ min.	½ hour
f/32	⅖ sec.	1⅓ sec.	4 sec.	8 sec.	1 min.	4 min.	10 min.	2 hours
f/64	1½ sec.	5 sec.	16 sec.	32 sec.	4 min.	16 min.	40 min.	8 hours

TABLE FOR ENLARGEMENTS.

From the British Journal of Photography Almanac.

Focus of Lens, inches.	TIMES OF ENLARGEMENT AND REDUCTION.							
	1 inch.	2 inches.	3 inches.	4 inches.	5 inches.	6 inches.	7 inches.	8 inches.
2	4 4	6 3	8 $2\frac{2}{3}$	10 $2\frac{1}{2}$	12 $2\frac{2}{5}$	14 $2\frac{1}{3}$	16 $2\frac{2}{7}$	18 $2\frac{1}{4}$
$2\frac{1}{2}$	5 5	$7\frac{1}{2}$ $3\frac{3}{4}$	10 $3\frac{1}{3}$	$12\frac{1}{2}$ $3\frac{1}{8}$	15 3	$17\frac{1}{2}$ $2\frac{11}{12}$	20 $2\frac{6}{7}$	$22\frac{1}{2}$ $2\frac{13}{16}$
3	6 6	9 $4\frac{1}{2}$	12 4	15 $3\frac{3}{4}$	18 $3\frac{3}{5}$	21 $3\frac{1}{2}$	24 $3\frac{3}{7}$	27 $3\frac{3}{8}$
$3\frac{1}{2}$	7 7	$10\frac{1}{2}$ $5\frac{1}{4}$	14 $4\frac{2}{3}$	$17\frac{1}{2}$ $4\frac{3}{8}$	21 $4\frac{1}{5}$	$24\frac{1}{2}$ $4\frac{1}{12}$	28 4	$31\frac{1}{2}$ $3\frac{15}{16}$
4	8 8	12 6	16 $5\frac{1}{3}$	20 5	24 $5\frac{4}{5}$	28 $4\frac{2}{3}$	32 $4\frac{4}{7}$	36 $4\frac{1}{2}$
$4\frac{1}{2}$	9 9	$13\frac{1}{2}$ $6\frac{3}{4}$	18 6	$22\frac{1}{2}$ $5\frac{5}{8}$	27 $5\frac{2}{5}$	$31\frac{1}{2}$ $5\frac{1}{4}$	36 $5\frac{1}{7}$	$40\frac{1}{2}$ $5\frac{1}{16}$
5	10 10	15 $7\frac{1}{2}$	20 $6\frac{2}{3}$	25 $6\frac{1}{4}$	30 6	35 $5\frac{5}{6}$	40 $5\frac{5}{7}$	45 $5\frac{5}{8}$
$5\frac{1}{2}$	11 11	$16\frac{1}{2}$ $8\frac{1}{4}$	22 $8\frac{1}{3}$	$27\frac{1}{2}$ $6\frac{7}{8}$	33 $6\frac{1}{2}$	$38\frac{1}{2}$ $6\frac{5}{12}$	44 $6\frac{2}{7}$	$49\frac{1}{2}$ $6\frac{3}{16}$
6	12 12	18 9	24 8	30 $7\frac{1}{2}$	36 $7\frac{1}{6}$	42 7	48 $6\frac{6}{7}$	54 $6\frac{3}{4}$
7	14 14	21 $10\frac{1}{2}$	23 $9\frac{1}{3}$	35 $8\frac{3}{4}$	42 $8\frac{2}{5}$	49 $8\frac{1}{6}$	56 8	63 $7\frac{7}{8}$
8	16 16	24 12	32 $10\frac{2}{3}$	40 10	48 $9\frac{3}{5}$	56 $9\frac{1}{3}$	64 $9\frac{1}{7}$	/2 9
9	18 18	27 $13\frac{1}{2}$	36 12	45 $11\frac{1}{4}$	54 $10\frac{4}{5}$	63 $10\frac{1}{2}$	72 $10\frac{2}{7}$	81 $10\frac{1}{8}$

The object of this table is to enable any manipulator who is about to enlarge (or reduce) a copy any given number of times, to do so without troublesome calculation. It is assumed that the photographer knows exactly what the focus of his lens is, and that he is able to measure accurately from its optical centre. The use of the table will be seen from the following illustration: A photographer has a *carte* to enlarge to four times its size, and the lens he intends employing is one of six inches equivalent focus. He must, therefore, look for 4 on the upper horizontal line, and for 6 in the first vertical column, and carry his eye to where these two join, which will be at 30—$7\frac{1}{2}$. The greater of these is the distance the sensitive plate must be from the centre of the lens; and the lesser, the distance of the picture to be copied. To *reduce* a picture any given number of times the same method must be followed, but in this case the greater number will represent the distance between the lens and the picture to be copied; the latter, that between the lens and the sensitive plate. This explanation will be sufficient for every case of enlargement or reduction.

If the focus of the lens be twelve inches, as this number is not in the column of focal lengths, look out for 6 in this column and multiply by 2, and so on with any other numbers.

TABLE OF EXPOSURES FOR ENLARGING AND REDUCING.

COMPILED BY MR. E. FERRERO, (CAMERA CLUB, LONDON.)

Showing the exposures to be given to Eastman's and Ilford slow bromide paper according to the actual intensity ratio of the lens, and to the actinic power of light, as measured by STANLEY'S ACTINOMETER.
Ilford rapid bromide paper requires one-fiftieth of the exposures indicated, gelatino-bromide plates of ordinary rapidity, one-fifteenth to one-twentieth, and Mawson and Swan's lantern plates three times.

Stanley's Actinometer.	$f/16$	$f/18$	$f/20$	$f/22$	$f/24$	$f/26$	$f/28$	$f/32$	$f/36$	$f/40$	$f/44$	$f/48$	$f/52$
	m. s.	m. s	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.
10 Seconds.	0 9	0 11	0 14	0 17	0 20	0 23	0 27	0 36	0 45	0 55	1 7	1 20	1 34
15 "	0 13	0 16	0 21	0 25	0 30	0 34	0 40	0 54	1 7	1 23	1 41	2 0	2 20
20 "	0 18	0 22	0 28	0 32	0 40	0 46	0 54	1 12	1 30	1 51	2 15	2 40	3 7
25 "	0 22	0 28	0 35	0 42	0 50	0 58	1 8	1 30	1 52	2 18	2 48	3 20	3 54
30 "	0 27	0 33	0 42	0 50	1 0	1 9	1 21	1 48	2 15	2 46	3 22	4 0	4 40
40 "	0 36	0 45	0 55	1 15	1 19	1 33	1 48	2 24	3 0	3 42	4 29	5 20	6 15
50 "	0 45	0 55	1 10	1 24	1 40	1 54	2 15	3 0	3 42	4 37	5 36	6 40	7 48
60 "	0 55	1 6	1 23	1 38	1 59	2 18	2 42	3 36	4 30	5 33	6 44	8 0	9 21
70 "	1 3	1 18	1 37	1 54	2 19	2 42	3 9	4 12	5 15	6 28	7 52	9 20	10 55
80 "	1 12	1 30	1 50	2 10	2 38	3 7	3 36	4 48	6 0	7 24	8 58	10 40	12 30
90 "	1 21	1 40	2 5	2 30	2 59	3 29	4 4	5 24	6 42	8 19	10 5	12 0	14 3
100 "	1 30	1 50	2 20	2 50	3 20	3 48	4 30	6 0	7 22	9 12	11 12	13 20	15 36
120 "	1 48	2 12	2 46	3 16	4 0	4 36	5 24	7 12	8 52	11 5	13 28	16 0	18 40
140 "	2 6	2 35	3 13	3 48	4 37	5 23	6 18	8 24	10 30	12 56	15 48	18 40	21 50
160 "	2 24	3 0	3 40	4 20	5 17	6 14	7 12	9 36	12 0	14 48	17 55	21 20	25 0
180 "	2 42	3 20	4 10	4 58	5 58	6 58	8 7	10 48	13 24	16 36	20 10	24 0	28 6
200 "	3 0	3 40	4 40	5 36	6 40	7 26	9 0	12 0	14 44	18 25	22 24	26 40	31 12
225 "	3 22	4 10	5 15	6 18	7 30	8 33	10 10	13 30	16 36	20 48	25 12	30 0	35 10
250 "	3 45	4 36	5 50	7 0	8 19	9 30	11 15	15 0	18 24	23 0	28 0	33 20	39 4
275 "	4 7	5 5	6 25	7 42	9 9	10 27	12 27	16 30	20 18	25 20	30 48	36 40	42 57
300 "	4 30	6 30	7 0	8 24	10 0	11 24	13 30	18 0	22 6	27 40	33 36	40 0	46 54

TABLE OF EXPOSURES FOR ENLARGING AND REDUCING—*Continued.*

Stanley's Actinometer.	$f/56$	$f/60$	$f/64$	$f/68$	$f/72$	$f/76$	$f/80$	$f/84$	$f/88$	$f/92$	$f/96$	$f/100$
	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.
10 Seconds.	1 48	2 5	2 22	2 40	3 0	3 20	3 42	4 4	4 28	4 54	5 20	5 47
15 "	2 42	3 7	3 33	4 0	4 30	5 0	5 33	6 6	6 42	7 21	8 0	8 40
20 "	3 37	4 10	4 44	5 20	6 0	6 40	7 24	8 9	8 57	9 48	10 40	11 33
25 "	4 30	5 17	5 55	6 40	7 30	8 21	9 15	10 9	11 12	12 17	13 30	14 27
30 "	5 25	6 15	7 5	8 0	9 0	10 1	11 6	12 12	13 25	14 42	16 0	17 20
40 "	7 12	8 20	9 28	10 40	12 0	13 22	14 48	16 17	17 54	19 36	21 20	23 7
50 "	9 0	10 34	11 50	13 22	15 0	16 42	18 30	20 21	22 23	24 33	26 40	28 54
60 "	10 50	12 30	14 10	16 1	18 0	20 2	22 12	24 25	26 50	29 24	32 0	34 40
70 "	12 40	14 34	16 33	18 42	21 0	23 23	25 54	28 30	31 19	34 18	37 20	40 27
80 "	14 24	16 48	18 55	21 22	24 0	26 43	29 36	32 33	35 48	39 12	42 40	46 15
90 "	16 12	18 45	21 18	24 3	27 0	30 3	33 18	36 38	40 17	44 10	48 0	52 0
100 "	18 0	21 8	23 40	26 44	30 0	33 24	37 0	40 42	44 46	48 56	53 20	57 48
120 "	21 40	24 58	28 21	32 0	36 0	40 5	44 24	48 50	53 40	58 48	64 0	69 0
140 "	25 20	29 7	33 6	37 23	42 0	46 45	51 48	57 0	62 39	69 0	74 40	81 0
160 "	28 48	33 17	37 50	42 43	48 0	53 27	59 12	65 7	71 36	78 0	85 0	92 0
180 "	32 36	37 30	42 35	48 5	54 0	60 6	66 36	73 15	80 20	88 0	96 0	104 0
200 "	36 0	42 17	47 20	53 28	60 0	66 47	74 0	81 24	89 0	98 0	106 0	116 0
225 "	40 48	46 50	53 15	60 20	67 27	75 8	83 15	91 31	100 0	110 0	120 0	130 0
250 "	45 0	52 50	59 10	66 40	74 55	83 30	92 30	101 38	111 0	122 0	133 0	144 0
275 "	49 51	58 13	65 5	73 30	82 25	91 0	101 45	111 45	124 0	135 0	146 0	159 0
300 "	54 0	63 26	71 0	80 0	89 55	100 10	111 0	122 6	134 0	147 0	160 0	174 0

THERMOMETRIC TABLES:

Showing the Assimilation of the Thermometers in Use Throughout the World.

Celsius.	Réaumur.	Fahrenheit.	Celsius.	Réaumur.	Fahrenheit.
100	80.0	212.0	49	39.2	120.2
99	79.2	210.0	48	38.4	118.4
98	78.4	208.4	47	37.6	116.6
97	77.6	206.6	46	36.8	114.8
96	76.8	204.8	45	36.0	118.0
95	76.0	203.0	44	35.2	111.2
94	75.2	201.2	43	34.8	109.4
93	74.4	199.4	42	33.6	107.6
92	73.6	197.6	41	32.8	105.8
91	72.8	195.8	40	32.0	104.0
90	72.0	194.0	39	31.2	102.2
89	71.2	192.2	38	30.4	100.4
88	70.4	190.4	37	29.6	98.6
87	69.6	188.6	36	28.8	96.8
86	68.8	186.8	35	28.0	95.0
85	68.0	185.0	34	27.2	93.2
84	67.2	183.2	33	26.4	91.4
83	66.4	181.4	32	25.6	89.6
82	65.6	179.6	31	24.8	87.8
81	64.8	177.8	30	24.0	86.0
80	64.0	176.0	29	23.2	84.2
79	63.2	174.2	28	22.4	82.4
78	62.4	172.4	27	21.6	80.6
77	61.6	170.6	26	20.8	78.8
76	60.8	168.8	25	20.0	77.0
75	60.0	167.0	24	19.2	75.2
74	59.2	165.2	23	18.4	73.4
73	58.4	163.4	22	17.6	71.6
72	57.6	161.6	21	16.8	69.8
71	56.8	159.8	20	16.0	68.0
70	56.0	158.0	19	15.2	66.2
69	55.2	156.2	18	14.4	64.4
68	54.4	154.4	17	13.6	62.6
67	53.6	152.6	16	12.8	60.8
66	52.8	150.8	15	12.0	59.0
65	52.0	149.0	14	11.2	57.2
64	51.2	147.2	13	10.4	55.4
63	50.4	145.4	12	9.6	53.6
62	49.6	143.6	11	8.8	51.8
61	48.8	141.8	10	8.0	50.0
60	48.0	140.0	9	7.2	48.2
59	47.2	138.2	8	6.4	46.4
58	46.4	136.4	7	5.6	44.6
57	45.6	134.6	6	4.8	42.8
56	44.8	132.8	5	4.0	41.0
55	44.0	131.0	4	3.2	39.2
54	43.2	129.2	3	2.4	37.4
53	42.4	127.4	2	1.6	36.5
52	41.6	125.6	1	0.8	33.8
51	40.8	123.8	0	0.0	32.0
50	40.0	122.0			

AMERICAN PHOTOGRAPHIC SOCIETIES.

AGASSIZ ASSOCIATION, MANHATTAN CHAPTER, N. Y. (Photographic Section.) *President,* W. T. Demarest; *Treasurer,* W. S. Miller; *Corresponding Secretary,* Edward B. Miller. Meetings, 103 Lexington avenue, New York City. Date of meetings, third Friday of each month at 8 P. M.

ALBANY CAMERA CLUB, Albany, N. Y. Organized January, 1888. *President,* Dr. Samuel B. Ward; *Treasurer* and *Secretary,* M. H. Rochester. Place of meeting, 20 North Pearl street. Meetings, first Friday in month.

AMERICAN INSTITUTE., N. Y. (Photographical Section).—New York City. Organized March 26, 1859. *President,* Henry J. Newton; *Vice-President,* John B. Gardner; *Treasurer,* Edward Schell; *Secretary,* Oscar G. Mason, Photographic Department, Bellevue Hospital, New York City. Place of meeting, Institute Hall, Clinton Buildings. Ordinary meetings at 8 P. M. on the first Tuesday of each month, except July and August.

AMERICA. PHOTOGRAPHERS' ASSOCIATION OF.—Organized, 1879. *President,* H. McMichael, Buffalo; *First Vice President,* G. H. Hastings, Boston; *Second Vice-President,* J. M. Appleton, Dayton, Ohio; *Treasurer,* G. M. Carlisle, Providence, R. I.; *Secretary,* O. P. Scott, Chicago. Tenth Annual Convention will meet at Boston, August 6th to 9th inclusive, 1889.

AMERICAN LANTERN SLIDE INTERCHANGE.—*Manager,* George Bullock; *Assistant-Managers,* William H. Rau, Philadelphia; Frederick C. Beach, New York. The members of the Interchange are the Society of Amateur Photographers of New York, represented by F. C. Beach; The Philadelphia Photographic Society, by W. H. Rau; Pittsburg Amateur Photographer's Society, by W. S. Bell; Cincinnati Camera Club, by George Bullock; Louisville Camera Club, by W. A. Peaslee; Chicago Lantern Slide Club, by W. A. Morse; St. Louis Camera Club, by H. B. Alexander; New Orleans Camera Club, by H. T. Howard; The New Brunswick (N. J.) Camerads, by Prof. Peter T. Austen. From December 1st to June 20th, of each year, exchanges of lantern slides are made monthly between each association, and annually with the Camera Club of England.

ATLANTA (GA.) CAMERA CLUB.—*President,* Prof. Sumner Salter; *Treasurer,* Dr. Frank O. Stockton; *Secretary,* F. J. Paxton, 66½ Whitehall street; *Corresponding Secretary,* Miss E. Marguerite Lindley, 124 Peachtree street. Place of meeting, 66½ Whitehall street. Meetings, second Monday of each month.

BALTIMORE (MD.) AMATEUR PHOTOGRAPHIC ASSOCIATION.—*President,* Isaac T. Norris; *Treasurer,* John H. Kimble; *Secretary,* Harry D. Williar. Place of meeting, 106 N. Charles street. Meeting, third Friday of each month.

BOSTON (MASS.) CAMERA CLUB, formerly Boston Society of Amateur Photographers.—*President,* Geo. E. Cabot; *Treasurer,* Wm. Garrison Reed; *Secretary,* Edw. F. Wilder, 47 Tremont street, Boston. Place of meeting, Club Rooms, 50 Bromfield street; meetings, first Monday of month, excepting June, July and August; entertainment meetings, third Mondays, except as above, and often when occasion requires.

BROOKLYN (N. Y.) ACADEMY OF PHOTOGRAPHY.—Incorporated April, 1887.—*President,* Wallace Gould Levison; *Treasurer* Edward H. Quantin; *Recording Secretary,* Geo. S. Wheeler; *Corresponding Secretary,* Willis Dodge, 346 Schermerhorn street, Brooklyn. Place of meeting, Hoagland Laboratory, cor. Henry and Pacific streets. Meetings, second Tuesday of each month.

BROOKLYN (N. Y.) SOCIETY OF AMATEUR PHOTOGRAPHERS.—*President,* Allan Ormsbee; *Vice-President,* Homer Ladd; *Treasurer,* Charles Blake; *Secretary,* George R. Sheldon, Jr., 57 Clark street.

BROOKLYN (N. Y.) PHOTOGRAPHIC ASSOCIATION.—*President,* E. Wagner; *Treasurer,* A. Roussel; *Secretary,* Chas. M. Heid, 412 Wyckoff street. Place of meeting, Arion Hall, Wall street. Meetings, first and third Wednesday of each month, 8:30 P. M.

BROOKLYN ACADEMY OF SCIENCE (Photographic Section).—Organized March 26, 1888. *Secretary,* J. W. Holbrook, Jr., 462 Hart street, Brooklyn, N. Y.

BROOKLYN INSTITUTE (Photographic Department).—Brooklyn Institute, Washington St., Brooklyn. *President,* Alexander Black, Brooklyn *Times* office; *Secretary,* Anna L. Meeker.

BROOKLYN CAMERA CLUB.—Organized January 3, 1888. *President,* Wm. F. Miller; *Vice-President,* M. E. Baker; *Treasurer,* M. L. Allen; *Secretary,* H. C. Mettler, 442 Fulton street, Brook-

lyn. Place of meeting, 442 Fulton street. Ordinary meetings, first Thursday of each month, 8 P. M.

BUFFALO (N. Y.) CAMERA CLUB.—*President*, George F. H. Bartlett, M.D.; *Treasurer*, Charles E. Hayes; *Recording Secretary*, Edwin L. Burdick; *Corresponding Secretary*, Thomas Carey Welch, 33 Law Exchange Building. Place of meeting, Buffalo Library Building. Meetings, twice a month. Regular meeting, first week; lantern slide, third week.

COLUMBIA COLLEGE (N. Y.) Amateur Photographic Society, New York.—Organized 1886. *President*, C. E. Gudewill; *Treasurer*, J. T. Davies, Jr.; *Secretary*, H. R. Taylor, School of Arts, Columbia College. Place of meeting, Columbia College. Meetings, twice a month during college term.

COLUMBIAN COLLEGE (Washington, D. C.) CAMERA CLUB.—Organized 1888. *President*, Allan J. Houghton; *Vice-President*, Edwin W. Ashford; *Treasurer*, A. J. Houghton; *Librarian*, W. B. Asmussen; *Secretary*, Chas. P. Spooner. Place of meeting, Columbian College, Washington, D. C. Ordinary meetings, every Wednesday afternoon.

CASE SCHOOL CAMERA CLUB (Cleveland, Ohio). Organized February, 1889.—*Hon. President*, Prof. C. F. Mabery, S. D.; *Hon. Vice-President*, Albert W. Smith, Ph. C.; *President*, Frank E. Hall; *Vice-President*, Lafayette D. Vorce; *Secretary* and *Treasurer*, J. Frank Moore; *Corresponding Secretary*, Milton B. Punnett. Meetings, Case School of Applied Science.

COLUMBUS (OHIO) CAMERA CLUB.—*President*, Rev. Geo. W. Lincoln; *Treasurer*, Jos. N. Bradford; *Secretary*, Frank H. Howe, King Building. Place of meeting, room 40, Pioneer Block. Date of meeting, third Thursday of each month.

CHICAGO (ILL.). PHOTOGRAPHIC SOCIETY OF.—*President*, Judge J. B. Bradwell; *Executive Committee*, F. A. Place, M. J. Steffins, H. D. Garrison, M. D.; *Treasurer*, G. A. Douglas; *Secretary*, C. Gentile, 134 Van Buren street. Place of meeting, Art Institute. Meeting, first Tuesday of each month.

CHICAGO (ILL.) LANTERN SLIDE CLUB.—*President*, Col. A. F. Stevenson; *Secretary*, W. A. Morse, 185 Wabash avenue. Place of meeting, Art Institute. Meetings, third Tuesday in month.

CANADA. PHOTOGRAPHIC ASSOCIATION OF.—*President*, A. T.

Barraud; *Secretary,* E. Poole, St. Catherines, Ontario. Place of meetings, Toronto. Meetings, August 20, 21, 22.

CAMBRIDGE CAMERA CLUB (Cambridgeport, Mass.)—*President,* J. A. Darling; *Treasurer,* C. W. Wilson; *Secretary,* H. Sumner Yates. Place of meeting, 23 William street. Meetings, first Tuesday in month.

CINCINNATI (OHIO) CAMERA CLUB (Photographic Section of Society of Natural History).—*Presideut,* Geo. Bullock; *Treasurer,* T. H. Kelly; *Secretary,* Emery H. Barton, 171 Race street. Place of Meeting, Natural History Society Rooms, 108 Broad, way. Meetings, first and third Mondays of each month.

CORNELL CAMERA CLUB, Ithaca, N. Y.—*President,* W. E. Reed; *Treasurer,* Geo. A. Bliss; *Secretary,* A. Vickers, Ithaca, N. Y. Place of meetings, Physical Lecture Room, Campus. Meetings, every two weeks; every other meeting a lantern slide exhibit.

CLEVELAND (OHIO) CAMERA CLUB.—*President,* Rev. Charles Pomeroy; *Treasurer,* D. Cole; *Secretary,* Charles Potter; *Corresponding Secretary,* Robert Dayton, M.D. Place of meeting, 5 Euclid avenue, Cleveland, Ohio. Meetings, first and third Tuesdays.

CRANFORD (N. J.) CAMERA CLUB.—*President,* R. M. Fuller; *Treasurer,* J. C. Wagstaff; *Secretary,* Wm. Chamberlain, Cranford, N. J. Place of meeting, Club Rooms. Meetings, every other Monday.

GERMAN PHOTOGRAPHIC SOCIETY OF NEW YORK.— Organized 1868. *President,* A. Mildenberger; *Vice-President,* H. Fruwirth; *Treasurer,* G. E. Pellnitz; *Financial Secretary,* L. Schill; *Corresponding Secretary,* H. G. Borgfeldt, 192 Washington street, Hoboken, N. J. Place of meeting, No. 62 East Fourth street, New York City. Ordinary meetings, second and fourth Wednesday of every month at 8:15 o'clock, P. M.

GRAND RAPIDS (MICH.) PHOTOGRAPHIC CLUB.—*President,* Dr. J. C. Parker; *Treasurer,* N. Fred. Avery; *Secretary,* J. B. Barlow Place of meeting, 15 Fountain street. Meetings, first and third Monday evenings each month.

HARTFORD (CONN.) CAMERA CLUB.—*President,* James B. Cone; *Secretary,* Edw. H. Crowell; *Treasurer* and *Corresponding Secretary,* Elmer M. White, P. O. Box 708. Place of meeting,

Club Room, room 61, Ætna Life Insurance Co. Building. Meetings, second Monday in each month, except July and August.

HAWAIIAN CAMERA CLUB (Honolulu, Sandwich Islands).—*President*, C. Hedemann; *Secretary*, A. W. Richardson. Meeting night, first Friday after first Monday in each month. Club Rooms, Campbell's Block, corner Fort and Merchant streets, Honolulu, H. I.

HOBOKEN (N. J.) CAMERA CLUB.—Organized at the residence of Mr. William Sachs, No. 432 Garden Steeet. W. Allen, *President*; C. Beckers, *Custodian*, and F. A. Huench, *Secretary*, 76 Bloomfield Street, Hoboken, N. J.

INDIANAPOLIS (IND.) CAMERA CLUB.—Organized November 25, 1887. *President*, Charles McBride; *Vice-President*, H. C. Chandler; *Treasurer* and *Secretary*, Carl H. Lieber; *Executive Committee*, J. T. Harris, Remo Steele, Henry Kothe. Place of meeting, 33 South Meridian street. Meetings, first Tuesday every month.

LOWELL (MASS.) CAMERA CLUB, formerly Lowell Association Amateur Photographers.—*President*, W. P. Atwood; *Treasurer*, H. W. Barnes; *Secretary*, G. A. Nelson, 81 Appleton street. Meetings, every third Tuesday. November to March inclusive with special meetings, subject to call of president.

LYNN (MASS.) CAMERA CLUB.—*President*, W. H. Drew; *Treasurer*, E. F. Bacheller; *Secretary*, J. W. Gibboney. Place of meeting, 347 Union street, Lynn, Mass. Meetings, first Tuesday of each month. Club nights, Tuesdays and Thursdays of each week.

LOUISVILLE (KY.) CAMERA CLUB.—*President*, C. R. Peaslee; *Vice-President*, Alex. Griswold; *Treasurer*, R. L. Stevens. Place of meeting, Polytechnic Building, Louisville, Ky. Date of meeting, 2d and 4th Tuesdays of each month.

MINNEAPOLIS (MINN.) CAMERA CLUB OF.—*President*, R. D. Cleveland; *Treasurer*, F. Read; *Secretary*, C. A. Hoffman, 22 Fourth street, South. Place of meeting, 20 Fourth street, South. Meetings, two Tuesdays each month.

MILBURY (MASS.) CAMERA CLUB.—*President*, T. D. Bristol, M. D.; *Treasurer* and *Secretary*, Miss E. R. Benson. Place of

meeting, rooms of the Millbury National History Society. Meetings, third Monday of each month.

MONTREAL (CAN.) AMATEUR PHOTOGRAPHIC CLUB.—*President*, Captain James G. Shaw; *Hon. Treasurer*, W. E. Bradshaw; *Hon. Secretary*, J. W. Davis, Alois Dept., G. T. Ry. Place of meeting, 2204 St. Catherine street. Meetings, first Monday each month. Annual meeting, 1889, December 2. Use of rooms at disposal of visiting photographers.

NEW BRUNSWICK (N. J.) CAMERADS.—Organized February, 1889. *President*, Prof. P. T. Austen; *Secretary*, Dr. Harry Tredwell. Meetings, Rutgers College. No regular. On call.

NEWARK (N. J.) CAMERA CLUB.—*President*, Wm. A. Halsey; *Treasurer*, J. M. Foote; *Secretary*, C. G. Hine. Place of meeting, 833 Broad street, Newark, N. J. Meeting, second Monday of each month.

NEW YORK (N. Y.) SOCIETY OF AMATEUR PHOTOGRAPHERS OF. —*President*, C. W. Canfield; *Vice-President*, David Williams; *Treasurer*, J. E. Plimpton; *Secretary*, Harry T. Duffield. Place of meeting, 122 West Thirty-sixth street. Meetings, second Tuesday in each month, except June, July and August.

NEW YORK (CITY) CAMERA CLUB.—*President*, Wm. T. Colbron. *Treasurer* and *Secretary*, J. H. Wainwright. Place of meeting, 314 Fifth avenue. Meetings, second Wednesday in January, April, July and October.

NEW ORLEANS (LA.) CAMERA CLUB.—*President*, H. T. Howard; *Vice-President*, J. A. Hincks; *Treasurer*, P. E. Carriere; *Secretary*, Chas. H. Fenner. Meetings at Tulane University, the third Wednesday of each month.

OREGON CAMERA CLUB (Portland, Oregon).—*President*, W. W. Bretherton; *Vice-President*, M. Goldsmith; *Secretary* and *Treasurer*, Edward Norton. Meetings at Club Rooms, Third and Morrison streets, third Friday of each month.

OLD COLONY CAMERA CLUB (Rockland, Mass.)—*President*, W. G. E. Freeman; *Treasurer*, David Smith; *Secretary*, Burton O. Estes. Meetings at Club Rooms, Liberty street, Wednesdays.

PROVIDENCE (R. I.) CAMERA CLUB.—Organized as Providence Amateur Photographic Association, 1884. Incorporated February, 1889. *President*, R. C. Fuller; *Treasurer*, J. E. Dansin; *Secretary*, J. E. Dansin; *Librarian*, A. B. Ladd. Place of

meeting, Swarts' Block, 81 Weybosset street. Meetings, first Saturday and Tuesday after third Saturday. Annual meeting, first Saturday in March.

PHILADELPHIA (PA.), PHOTOGRAPHIC SOCIETY OF.—*President*, Frederic Graff; *Treasurer*, Samuel Fox; *Secretary*, Robert S. Redfield, 1601 Callowhill street. Place of meeting, 1305 Arch street. Meetings, stated, first Wednesday evening of each month. Conversational, third Monday.

PHILADELPHIA AMATEUR PHOTOGRAPHIC CLUB.—Organized December 21, 1883. Incorporated February 12, 1887. *President*, Francis A. Cunningham; *Vice-President*, P. S. Chase; *Treasurer*, W. S. Buchanan; *Secretary*, Alfred Thompson, 1311 Butler street. Place of meeting, 907 Filbert street. Ordinary meetings, third Monday, 8 P. M. Annual meeting, third Monday in December.

PACIFIC COAST AMATEUR PHOTOGRAPHIC ASSOCIATION.—*President*, A. J. Treat; *Treasurer* and *Secretary*, J. H. Johnson, 414 Buchanan street, San Francisco, Cal. Place of meeting, 605 Mercantile street. Meetings, first Thursday after first Monday in each month.

PITTSBURG (PA.) AMATEUR PHOTOGRAPHERS' SOCIETY.—*President*, W. S. Bell; *Treasurer*, G. A. Hays; *Secretary*, F. R. C. Perrin, Crafton, Allegheny Co., Pa. Place of meeting, 59 Fourth street. Meetings, second Monday of each month, 7:30 P. M.

PLAINFIELD (N. J.) CAMERA CLUB.—*President*, Oscar S. Teale; *Treasurer*, W. H. Lyon, Jr.; *Secretary*, G. Harry Squires, 108 Broadway. Place of meeting, Club Rooms, 12 Park Avenue. Meetings, first Monday in each month.

POSTAL PHOTOGRAPHIC CLUB.—*President*, Randall Spaulding; *Treasurer* and *Secretary*, Dr. J. Max Mueller. Secretary's address, West Chester, Pa.

QUEBEC (CANADA) CAMERA CLUB.—*President*, Captain Jas. Peters; *Treasurer*, Jas. Brodie; *Secretary*, Ernest F. Würtele, 93 St. Peter street, Quebec. Place of meeting, Captain Imlah's Quarters, Citadel annual meetings, second Monday of December.

ROCHESTER (N. Y.) CAMERA CLUB OF.—*President*, George Hanmer Croughton; *Treasurer*, James Streeter; *Secretary*, Peter Maudsley, 42 Smith avenue. Place of meeting, Kirley

Block, East Main street. Meetings, every alternate Thursday. Intervening Thursday evenings devoted to informal gatherings.

SELMA (ALA.) Y. M. C. A. CAMERA CLUB.—*President*, Chas. E. Bailey; *Treasurer* and *Secretary*, S. Orlando Trippe. Place of meeting, Y. M. C. A. Building, Broad street. Meetings, first Thursday of each month.

SYRACUSE (N. Y.) CAMERA CLUB.—*President*, Arthur P. Yates; *Vice-President*, Amos Padgham; *Treasurer*, Charles R. Jones; *Secretary*, Wallace Dickson, P. O. Box 129. Place of meeting, Club Rooms, 72 South Salina street. Meetings, every Friday evening.

SPRINGFIELD (MASS.) CAMERA CLUB.—*President*, W. P. Draper; *Treasurer*, N. P. Amos Carter; *Secretary*, John Leshun. Place of meeting, Cor. Main and Sanford streets. Meetings, third Wednesday of each month.

STEVENS PHOTOGRAPHIC SOCIETY, Hoboken, N. J.—*President*, A. R. Whitney, Jr.; *Treasurer*, C. E. Pearce; *Secretary*, E. W. Franzar. Place of meeting, Stevens Institute, Prof. De Volson Wood's Lecture Room. Meetings, first Wednesday in month.

SOUTHERN TIER PHOTOGRAPHIC ASSOCIATION.—*President*, W. L. Sutton; *Treasurer*, J. S. Ryder; *Secretary*, A. B. Stebbins, Canisteo, N. Y. Place of meeting, decided from time to time. Meetings, third Thursday of each month.

SAINT LOUIS (MO.) CAMERA CLUB.—*President*, Robert E. M. Bain; *Vice-President*, Rev. C. M. Charroppin, S. J.; *Secretary* and *Treasurer*, W. M. Butler, 2636 Osage street, St. Louis, Mo. Place of meeting, St. Louis University, Cor. Grand avenue and Pine street. Meetings, first and third Tuesdays of month.

TEXAS STATE (TEX.) PHOTOGRAPHERS' ASSOCIATION.—*President*, J. S. Webster and six *Vice-Presidents*; *Treasurer*, S. T. Blessing; *Secretary*, C. F. Cooke. Place of meeting, at different places in the State. Meetings, conventions twice a year.

TORONTO (CAN.) AMATEUR PHOTOGRAPHERS' ASSOCIATION.—*President*, G. O. E. Bethune; *Vice-President*, W. B. McMurrick; *Treasurer* and *Secretary*, F. D. Manchee. Place of meeting, College of Physicians and Surgeons, Bay street, Toronto. Meetings, first Monday of month. Weekly club night, Monday evening.

WATERTOWN (N. Y.) CAMERA CLUB.—*President*, H. M. Hill,

A. M.; *Treasurer*, L. C. Child; *Secretary*, George I. Woolley. Watertown, N. Y. Place of meeting, Watertown High School. Meetings, first Monday of month.

WASHINGTON (D. C.) CAMERA CLUB.—Organized November, 1883, as the Argents; reorganized March, 1887; incorporated May, 1888, as the Washington Camera Club. *President*, R. J. Fisher, Jr.; *Vice-President*, B. Perry Pierce; *Secretary* and *Treasurer*, S. H. Griffiths, M. D., M. S. N.; *Corresponding Secretary*, J. Albert Cole, office of Supervising Architect, United States Treasury Department, Washington, D. C.

WATERBURY (CONN.). PHOTOGRAPHERS' SOCIETY OF.—*President*, Chas. R. Pancoast; *Treasurer*, E. W. Mooney, Jr.; *Secretary*, Wm. L. White, 100 Cooke street. Place of meeting, room 18, Baldwin's Block, 63 Bank street. Meetings, Friday evenings.

WORCESTER (MASS.) LANTERN SLIDE CLUB.—*President* and *Corresponding Secretary*, Dr. Geo. E. Francis. Meetings, every second Tuesday, 4 Elm street. Exchanges slides with other similar organizations.

WORCESTER (MASS.) CAMERA CLUB.—*President*, Dr. E. V. Scribner; *Treasurer*, Geo. H. Corbett; *Secretary*, Paul B. Morgan. Place of meetings, Natural History Society Rooms, Foster street. Second Tuesdays in month. Annual meetings in January.

YONKERS (N.Y.) AMATUER PHOTOGRAPHERS' CLUB.—Organized February 15, 1889. *President*, G. Livingston Morse; *Treasurer* and *Secretary*, Robert M. Reevs, Box 720, Yonkers, N. Y. Place of meeting, Dey's Building, Cor. Warburton and Well's avenues. Meetings, first Friday in month. Annual, first Friday in April. (Informal every Friday).

PHOTOGRAPHIC SOCIETIES OF THE BRITISH ISLES AND BRITISH COLONIES.

Great pains have been taken to ensure a complete and correct list of societies, and every secretary whose address is known has been communicated with. It is believed that the following list of 120 societies is the largest which has ever been compiled and published. Corrections and additions should be forwarded to the English editor, Mr. W. Jerome Harrison, 365 Lodge Road, Hockley, Birmingham.

ABERDEEN AND NORTH OF SCOTLAND AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1855. The annual meeting is held in April in the Café Shiprow. *President*, John Milne. *Vice-President*, Robert Houston. *Council*, T. W. Binner and Alex. McKilligan. *Treasurer*, Alex. Edward, jun. *Secretary*, James Main, 8 Elmfield avenue, Aberdeen.

ALBANY INSTITUTE AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1888. Meetings January 1, and every other Tuesday throughout the year, in the Institute, 345 Albany road, Walworth, S. E. *President*, G. S. Martin. *Committee*, G. H. A. Bucknole, H. Harvey, W. Liberty, J. S. Simon. *Curator*, W. Rhodes. *Librarian*, W. A. Cordrey. *Hon. Secretary and Treasurer*, Alfred B. Gee, 19 Drakefell road, Nunhead, S. E.

AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1861. *President*, His Royal Highness the Prince of Wales. *Vice-Presidents*, H. S. H. The Duke of Teck, G. C. B., The Most Noble, the Marquis of Drogheda, Lieut.-General the Right Hon. the Lord de Ros, The Right Hon. the Earl of Rosse, F. R. S., James Glaisher, Esq., F. R. S., F. R. A. S., etc. *Council*, Sir J. Whittaker Ellis, Bart., M. P., Sir Spencer Marion Wilson, Bart., Walter Wood, Esq., F.R.G.S., W. D. Howard, Esq., F.I.C., Charles Stephens, Esq., M.A. (Oxon.), W. S. Hobson, Esq., John Aird, Esq., M.P. *Hon. Secretary*, Arthur James Melhuish, Esq., F.R.A.S., and F.R. Met. Soc. *Offices*, 12 Old Bond street, London, W.

AMATEUR PHOTOGRAPHIC ASSOCIATION OF VICTORIA, MELBOURNE.—The Association meets on the second Tuesday in each

month at the Royal Society's Hall, Victoria street, Melbourne. Visitors from British, American, or Continental Societies will be made welcome at any of the meetings. *President,* E. C. Bell. *Vice-Presidents,* F. A. Kernot and John Lang. *Committee,* J. H. Mulvany, H. C. Ward, J. McEwan, A. M. Henderson, E. J. Hughes. *Hon. Librarian,* E. A. Walker. *Scientific Custodian,* R. W. Harvie. *Hon. Treasurer,* J. J. Fenton. *Hon. Secretary,* J. H. Harvey, 278 Victoria parade, East Melbourne.

AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1852. Monthly outings during the Summer. Indoor meetings monthly during the Winter. Annual meeting in March. *President,* T. M. Brownrigg. *Treasurer and Secretary,* W. Wainwright, Hoe place, Woking.

AMATEUR PHOTOGRAPHIC SOCIETY OF MADRAS.—*Patrons,* Lord Connemara and Lieut.-General Sir C. G. Arbuthnot, K.C.B., R.A. Commander-in-Chief, Madras. *President,* F. B. Hanna, M. A., M.I.C.E. *Vice-Presidents,* J. C. Hannyngton, C.S., and C. Michie-Smith; B. Sc. *Committee,* Colonel A. Curtois, T. M. Horsfall, G. Oppert, Ph.D., W. G. Pavey, C. V. Sundarum Sastri, Captain R. H. C. Tufnell, M.S.C. *Secretary and Treasurer,* F. Dunsterville, Rayapuram, Madras.

AUCKLAND PHOTOGRAPHIC SOCIETY.—Meetings on second Thursday in each month. *Secretary,* A. G. Tibbutt, Auckland, New Zealand.

BATH PHOTOGRAPHIC SOCIETY.—Established 1888. Meetings on last Wednesday of each month at 8 P.M., at the Bath Royal Literary and Scientific Institution, Terrace Walks. Annual meeting in February. *President,* W. Pumphrey. *Vice-President,* Austin J. King. *Committee,* Philip Braham, Friese Greene, Aug. F. Perren, Walter Pitt, George F. Powell. *Hon. Secretary and Treasuer,* W. Middleton Ashman, 34 Gay street, Bath.

BATLEY AND DISTRICT PHOTOGRAPHIC SOCIETY.—*President,* Henry Spedding. *Hon. Secretary,* Herbert Marnith, Batley.

BIRKENHEAD PHOTOGRAPHIC ASSOCIATION.—Established 1884. Meetings held second Thursday in each month at 7:30 P.M., at the free public library, Hamilton street. Annual meeting in November. *President,* Paul Lange. *Vice-President,* P. H. Phillips. *Council,* J. A. Forrest, H. H. Williams, H. Lupton, T. C. James, H. Wilkinson, T. S. Mayne, G. A. Carruthers, F. N.

Eaton. *Treasurer*, F. Evans. *Secretary*, John L. Mackrell, 26 Lorne street, Fairfield, Liverpool.

BIRMINGHAM PHOTOGRAPHIC SOCIETY.—Established 1885. The society meets on the second and fourth Thursday of October, November, December, January, February and March, and on the fourth Thursday only of the six Summer months, at 7:30 P.M., in the society's rooms, at the Grand Hotel, Colmore Row. *President*, R. H. Norris, M.D. *Vice-Presidents*, W. Jerome Harrison, F.G.S., B. Karleese, E. H. Jaques. *Council*, J. J. Button, E. C. Middleton, G. A. Thomason, J. C. Fowler, F. Barnett, F. Hoskins, S. G. Mason, A. Pumphrey, W. T. Horton. *Treasurer*, Thomas Taylor. *Librarian*, S. T. Holliday. *Secretaries*, J. H. Pickard, 361 Moseley road, and William Rooke, Ascot road, Moseley.

BLACKBURN LITERARY CLUB (PHOTOGRAPHIC SECTION).—Established 1884. Each section of the club is managed by its own Secretary. Meetings and excursions at intervals during the season. *President*, T. J. Syckelmoore, B.A. *Vice-President*, Charles Smithies. *Hon. Secretary*, E. S. Johnson, Literary Club, Blackburn.

BOLTON PHOTOGRAPHIC SOCIETY.—Established 1879. Ordinary meetings held at the Baths, Bridgman street, on the first Thursday in each month from September to May, at 8:00 P.M. Annual meeting, first Thursday in October. *President*, J. R. Bridson. *Vice-Presidents*, E. N. Ashworth, R. Harwood, W. Banks, Walter Knowles, Rev. J. W. Cundey, Thomas Parkinson. *Council*, J. Boothroyd, W. Laithwaite, T. Davis, J. Leach, Charles J. P. Fuller, J. Lomax, Dr. Johnston, R. Mercer. *Hon. Treasurer*, C. K. Dalton. *Hon. Secretary*, B. H. Abbatt, 12 Corporation street, Bolton.

BOLTON PHOTOGRAPHIC CLUB.—Established 1883. Meetings are held every Tuesday evening, at the studio of the Club, Chancery Lane, Bolton, at 8 o'clock, P.M. *President*, Jabez Boothroyd. *Vice-President*, Thomas Jukes. *Committee*, Messrs. Hawksworth, Banks, Bradshaw, Ashworth, Sewell. *Treasurer*, John Bradshaw. *Secretary*, James Slater, Town Hall Square, Bolton.

BRADFORD PHOTOGRAPHIC SOCIETY.—Established 1882. Meetings held at 55 North Parade, on the second Tuesday in the month, from October to June inclusive, at 7:45 o'clock P. M.

Annual meeting, October. *President*, Duncan G. Law. *Vice-Presidents*, H. Forsyth and W. H. Scott. *Committee*, J. Sonnenthal, Rev. Wm. Aston, LL.D., B.A., M. B. Wallace, J. E. Fawcett, H. H. Tankard, Rev. T. Mellodey, George Roberts, W. Leach. *Treasurer and Secretary*, William S. Smith.

BRECHIN PHOTOGRAPHIC ASSOCIATION.—Established 1888. Meets in the Mechanics' Institute on the first Wednesday of each month at 8:15 o'clock P.M. *President*, William Shaw Adamson, Causton Castle. *Vice-Presidents*, Dr. Anderson and R. Adamson Scott, M.A. *Council*, W. Lyall, J. C. Middleton, D. Hodgeton, jun. *Secretary and Treasurer*, James D. Ross, 13 Park road, Brechin, N. B.

BRIGHTON PHOTOGRAPHIC SOCIETY.—Established 1889. Meetings on the 2d and 4th Tuesdays from October 1st to April 30th, and monthly from May 1st to September 30th, held at the Lecture Hall, New Road. *President*, W. H. Reau, M. R. C. S. *Vice-President*, W. Jago, F. C. S., F. I. C. *Committee*, E. J. Bedford, D. E. Caush, L. D. S., F. O. Devereux, G. Foxall, S. B. Hardcastle, G. Perren, Burt Sharp, R. Walls, R. Wicks. *Treasurer*, J. P. Slingsby Roberts. *Secretary*, A. H. C. Corder, 42 Montpelier Road, Brighton.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.—Established 1831. Will meet in 1889 at Newcastle-on-Tyne, September 11. *President*, Sir F. J. Bramwell, F. R. S. *President-Elect*, Professor W. H. Flower, C.B., F.R.S. *Treasurer*, Dr. A. W. Williamson, F.R.S. *General Secretaries*, Sir D. Galton, K.C.B., and A. V. Harcourt, F.R.S. *Secretary*, A. T. Atchison, 22 Albemarle street, London, W.

BRISTOL CAMERA SOCIETY.—Established 1887. Meetings of the Society held on the fourth Thursday in each month from April to September, and on the second and fourth Thursdays from October to March. Field excursions, once a month from April to September. Annual meeting, second Thursday in October. *President*, Harvey Barton. *Vice-Presidents*, Arthur Richardson, Ph.D., J. M. Munro. *Council*, C. Bryant, W. W. Baker, W. M. Appleton, E. Harris, M. Lavington, G. Young. *Treasurer*, H. F. Lewis, 8 Meridian road, Redland. *Honorary Secretaries*, F. Holmes, T. Routledge. Communications should be addressed to the Honorable Secretaries, Bristol Camera Society, University College, Tyndall's Park, Bristol; where the meetings of the Society are also held.

BRISTOL AND WEST OF ENGLAND AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1871. Meetings, third Wednesday in each month, at Queen's Hotel, Clifton, at 7:30 P.M. Annual meeting in January. *President*, T. Davey. *Vice-Presidents*, Colonel Playfair and H. A. H. Daniel. *Council*, Messrs. W. W. Boyden, J. Phillips, W. B. Wright, and the officers of the Association. *Treasurer and Secretary*, Edward Brightman, Lyndale, Redland road, Bristol.

BROCKLEY AND ST. JOHN'S SCIENTIFIC SOCIETY.—*President*, A. E. Lamb. *Vice-Presidents*, W. J. Spratling, B.Sc., F.G.S., etc., F. J. Taylor, B.A., M.B., Jenner Weir, F.L.S., F.Z.S. *Secretary*, Lewis M. Biden, 11 Leadenhall street, London, E.C.

BURNLEY PHOTOGRAPHIC SOCIETY.—Established 1885. *President*, J. Butterworth, J.P. *Vice-Presidents*, D. Drew, J. C. Brumwell, M.D., J.P. *Honorable Treasurer*, C. J. Howson. *Honorable Secretary*, W. Sutcliffe, 7 Bank Hall Terrace, Burnley. *Council*, W. Chadwick, J. Holgate, J. S. See, S. Edmondson, J. W. Houlden, J. Pickles. Ordinary meetings held on the last Wednesday in each month at 7:30 P.M. in the Society's rooms, Bank Chambers, Hargreaves street, Burnley. Visitors belonging to kindred societies are welcome to use of dark room.

BURY PHOTOGRAPHIC AND ARTS CLUB.—Established 1882. Ordinary meetings held every third Wednesday in each month. Annual meeting, third Wednesday in October, at 7:30 P.M. *President*, F. Cooper. *Vice-Presidents*, E. W. Mellor and W. S. Barlow. *Council*, Robert Grundy, jun., H. M. Dearden, C. H. Openshaw, A. Taylor, R. Wood. *Auditors*, J. Newbold and W. Booth. *Treasurer*, R. Grundy, sen., Walmersly road, Bury. *Secretary*, F. W. Livsey, 110 Victoria Terrace, Walmersly road, Bury.

CAMBRIDGE UNIVERSITY PHOTOGRAPHIC SOCIETY.—Established 1882. Meetings and places are irregular. *President*, W. N. Shaw. *Vice-President*, Rev. A. Chapman. *Committee*, W. J. Armitage, J. B. Marsden-Smedley, W. H. Banks. *Treasurer and Secretary*, W. Harold Tingey, Trinity Hall, Cambridge.

CAMERA CLUB.—Established 1885. 21 Bedford street, W. C. The Club is open on week days from 10 A.M. to midnight, and on Sundays from 10 A.M. to 11 P.M. It combines the ordinary advantages of a club with the appliances and conveniences of a photographic society, including the use of a well-appointed dark room,

available to members at all times, enlarging apparatus, etc. A club journal is published and sent free, monthly, to members. Meetings for photographic discussions are held every Thursday at 8 P.M. from October to May. Summer outdoor meetings. Social gathering on the first Monday of each month from October to May. Annual Photographic Conference. *President*, Captain W. de W. Abney, R.E., C.B., F.R.S. *Committee*, Sir George R. Prescott, Bart, (*Chairman*), Frederic Machell Smith (*Vice-Chairman*), G. F. Bruce, John Beverly Campbell, Lyonel Clark, Francis Cobb, John France Collins, A. Deed, Arthur Robert Dresser, Enrico Ferrero, J. Gale, William Asbury Greene, Charles Williams Hastings, Richard Biddulph Martin, J. L. McCance, Sidney Platt, J.P., Andrew Pringle, John F. Roberts, Douglas Pound Rodgers, Sir David Salomons, Bart., Lieut.-Colonel George Hope Verney, S. B. Webber. The President and the Honorary Secretaries (*ex-officio*). *Secretaries*, George Davison and Ernest George Spiers, 21 Bedford street, Covent Garden, W.C.

CARDIFF AMATEUR PHOTOGRAPHIC SOCIETY.—The monthly meetings are held at the Society's rooms every alternate Wednesday at 8 P.M. Informal meetings each Wedneseay evening. Rooms and studio, Great Frederick street, Cardiff. *President*, T. Mansel Franklin. *Vice-Presidents*, Jonas Watson, J.P., Walter Insole, S. W. Allen, M.I.M.E., Alex. Kellar. *Treasurer*, W. Foster. *Honorable Secretaries*, G. H. Bedford, 127 Bute road; G. H. Wills, Jun., Merchants' Exchange.

CARLISLE AND COUNTY AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1885. Meetings, first Monday in each month in the Cathedral Hall, 57 Castle street, Carlisle. *President*, the Mayor of Carlisle. *Vice-President*, C. S. Hall, M.R.C.S., F.M.S. *Committee*, T. Bushby, J. Robson, J. H. Coward, F. Ritson, D. L. Thorpe, J. G. Moffett. *Treasurer*, John Forsythe, 48 Aglionby street. *Honorary Secretary*, H. Y. Thompson, L.S.A. *Honorary Assistant Secretary*, John S. Atkinson, 33 Princess street, Carlisle.

CHELTENHAM PHOTOGRAPHIC SOCIETY.—Established 1865. Meetings on the second Thursday in each month from October to May inclusive. *President*, C. E. F. Nash, M.A. *Committee*, the officers, and Baynham Jones, G. S. Penny, W. W. Whittard. *Treasurer*, J. Bull. *Secretary*, W. C. Beetham, 22 Promenade Villas.

CHESTER SOCIETY OF NATURAL SCIENCE (Photographic Section). —Established 1887. Annual meeting held on the last Friday in March at 8 P. M., at the Grosvenor Museum. *Chairman*, E. W. Parnell, F.C.S.. *Committee*, Dr. Stolterfoth, C. W. Townsend, E. W. Cowan, W. P. James Fawcus, F. Evans, Rev. A. H. Fish, B.Sc., A. G. Ayrton. *Treasurer* and *Secretary*, George Frater, 3 Lorne street, Chester.

CORNISH CAMERA CLUB.—Established 1888. Club mettings on the first Tuesday in each month at the Royal Cornwall Geological Museum. *President*, G. Lacy. *Vice-President*, B. Vivian, M.R.C.S. *Council*, Colonel J. H. Biggs, W. E. Bailey, F.L.S.P., N. H. Symons. *Honorary Treasurer*, W. H. Percy; *Honorary Secretary*, A. K. Barnett, F.G.S., 11 Penrose Terrace, Penzance.

COVENTRY AND MIDLAND PHOTOGRAPHIC SOCIETY.—Established 1883. Meetings are held on the first Wednesday in each month at the Dispensary at 8 P. M. Outdoor excursions during the Summer months. Annual meeting in November. *President*, Councillor Andrews. *Vice-Presidents*, C. Ambrose, C. H. Waters, H. Sturmey, G. Winstanley. *Council*, F. W. Hardy, T. W. Owen, A. B. Clarke, W. L. J. Orton, and the whole of the officers. *Treasurer*, E. J. Walker. *Honorary Secretary*, Fred W. Dew, The City Studio, Coventry.

COVENTRY DISTRICT CYCLISTS' SOCIETY. (Photographic Section).—Headquarters, Queen's Hotel, Coventry. *President*, F. W. Dew. *Honorary Secretary*, F. J. Harker, 40 Smithford street, Coventry. Outdoor excursions and meetings for reading of papers, discussion, etc., every week alternately during the season.

CREWE AMATEUR PHOTOGRAPHIC SOCIETY.—Members of the Council. *President*, Rev. W. G. Rainsford, M. A. *Vice-Presidents*, Col. Cotton, Major Gosset, W. W. G. Webb, Esq. *Treasurer*, W. Bispham. *Committee*, H. Charles, G. Elliott, T. Gorrell, S. H. Hayward, J. R. Jones, J. Lewis, F. C. Tipler. *Honorary Secretary*, W. A. Whiston, 13 Union street.

CROYDON MICROSCOPICAL AND NATURAL HISTORY CLUB. (Photographic Section).—*President*, Henry G. Thompson, M. D. *Committee*, A. H. Allen, Kenneth McKean, W. Low Sarjeant. *Honorary Secretary*, Charles Hussey, Braeside, Epsom Road, Croydon.

Darlington Photographic Society. Established 1888.—Meetings held on the second Monday in the month. Annual meeting in November. *President,* G. Newby Watson. *Vice-President,* J. A. Fothergill, M. R. C. S. *Council,* R. A. Luck, W. F. K. Stock, J. I'Anson, T. Howlett. *Treasurer,* E. Ensor, M. A. *Honorary Secretary,* W. Garritte Brewis, Blytheville, Darlington.

Dartmouth Amateur Photographic Society.—*President,* Roger Mostyn. *Committee,* E. Anwyl, E. Bearcroft, L. Michelmore, C. Michelmore, C. Sims, J. H. Spanton, William Simpson, G. R. Whitaker, R. Whitaker. *Honorary Secretary* and *Treasurer,* George Barston.

Derby Photographic Society. Established 1884.—Ordinary monthly meetings second Tuesday in each month. Annual meeting, second Tuesday in October. Held at Syke's Restaurant, Victoria street, Derby. *President,* Captain W. de W. Abney, R. E., C. B., F. R. S. . *Vice-Presidents,* C. Bourdin, A. B. Hamilton, R. Keene, T. Scotton. *Committee,* J. A. Cope, Dr. Highton, W. Hart, C. B. Keene, R. Woods. *Treasurer* and *Secretary,* E. J. Lovejoy, 73 Grove street, Derby.

Devon and Cornwall Camera Club.—*Honorary Secrètaries,* Major Barrington Baker, H. M., Gun Wharf, Devonport. D. Roy, Bank Chambers, Plymouth.

Doncaster Microscopical and Scientific Society.—*Honorable Secretary,* M. H. Stiles, Doncaster.

Dorset Amateur Photographic Association.—Established 1886. *President,* W. Miles Barnes, M. A. (Cantab.) *Committee,* Lord Carlow, Dr. George, R. M. Lee, F. Dymond. *Secretary,* Rev. E. J. Pope, M. A. (Oxon.), Bradford-Peverell Rectory, Dorchester.

Dukinfield Photographic Society.—Established 1888. Ordinary meetings, Coöperative Hall, fourth Tuesday, at 7:30 p. m. Annual meeting, fourth Tuesday in April. *President,* John Ashworth. *Vice-Presidents,* John T. Lees, T. H. Gordon, B. A., J. H. Brooks. *Council,* W. Jenkinson, J. Leech, J. T. Lambert, G. Robinson, C. W. Thompson, J. Winterbottom. *Treasurer,* H. Veevers, C. E. *Secretary,* William H. Thirley, Commercial Buildings, King street, Dukinfield.

Dundee and East of Scotland Photographic Association.

Established 1879.—Meetings are held on the first Thursday of each month from October till May both inclusive, in Lamb's Hotel, Dundee, at 8 P. M., and three outdoor meetings during Summer. *Patron*, The Right Honorable The Earl of Strathmore; *President*, John Robertson; *Vice-President*, J. K. Tulloch, M. B.; *Council*, J. C. Cox, J. D. Cox; W. B. Dickie, G. D. Macdougald, G. G. Maclaren, J. Mathewson, F. Salmond, A. Stewart, W. D. Valentine, J. R. Wilson; *Honorary Treasurer* and *Secrctary*, V. C. Baird, Broughty Ferry, by Dundee.

EDINBURGH PHOTOGRAPHIC CLUB.—Established 1881. The ordinary meetings are held at 5 St. Andrew Square, at 8 P.M., on the third Wednesday of each month. The annual meeting on the third Wednesday of November. The club is limited to thirty members. *Board of Management: Convener*, Dr. John Thomson, R. N.; *Treasurer*, James C. H. Balmain; *Secretary*, James Jameson, 84 Pitt street, Edinburgh.

EDINBURGH PHOTOGRAPHIC SOCIETY. Established 1861.—Ordinary meetings are held on the first Wednesday of each month, except July, August and September, in the Professional Hall, 20 George street, at 8 o'clock. The annual meeting is held in November. *Patron*, H. R. H. The Duke of Edinburgh; *President*, Hippolyte J. Blanc, F. S. A. Scotland; *Vice-Presidents*, Thomas W. Drinkwater, M. D., F. C. S., William T. Bashford. *Council*, J. C. H. Balmain, F. Briglmen, John Hay, Alexander A. Inglis, Alexander Ayton, F. P. Moffat, A. H. Baird, W. B. Mitchell, W. Dougall, W. Forgan, G. G. Mitchell, T. Wardale. *Curator*, Herbert W. Bibbs. *Treasurer*, James McGlashan. *Secretary*, Hugh Brebner, 13 Maitland street, Edinburgh.

GLASGOW AND WEST OF SCOTLAND AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1882. Rooms, 180 West Regent street, Glasgow. Ordinary meetings, third Tuesday of each month, October to April, at 7.30 P. M. Annual meeting in January. Informal meeting, every Tuesday throughout the year at 8 P. M. Dark room available for visitors. *President*, Ralph H. Elder. *Vice-President*, Archibald Watson. *Council*, William Lang, Jr., R. B. M. Stewart, J. C. Oliver, John Morrison, Jr., Dr. McCorkindale, Thomas Taylor. *Treasurer*, Hugh Reid. *Secretary*, William Goodwin, 3 Lynedoch street, Glasgow.

GLASGOW PHOTOGRAPHIC ASSOCIATION.—Established 1862. Meetings are held in Religious Institution Rooms, 177 Buchanan

street, first Thursday in each month, at 8 P. M. *President*, William Lang, Jr., F. C. S. *Vice-Presidents*, R. Dodd and A. Robertson. *Council*, T. N. Armstrong, William Brown, George Mason, William J. McIlurick, Andrew Mactear, J. Urie, Jr. *Treasurer*, George Bell, 57 Argyle street, Glasgow. *Secretary*, J Craig Annan, 153 Sauchiehall street, Glasgow.

GLOUCESTER PHOTOGRAPHIC SOCIETY.—Reconstructed 1887. *President*, Walter B. Wood. *Vice-President*, W. J. Jenkins. *Committee*, A. S. Helps, Dr. Hodges, A. H. Pitcher. *Honorary Treasurer*, H. S. Crump. *Honorary Secretary*, F. H. Burr. Society's reading and dark rooms, Bank Buildings, Gloucester. Meetings, fourth Monday in each month. Place of meeting, School of Science, Gloucester.

HALIFAX PHOTOGRAPHIC CLUB.—Established 1881. Meets the last Thursday in each month in the Mechanics Hall, at 7:30 P. M. *President*, B. Rowley. *Vice-Presidents*, T. Illingworth and E. J. Smith. *Council*, B. B. Bingley, Major Holroyde, Henry Mossman, Councillor S. Smith, Joseph Whitely, together with the officers. *Auditor*, S. Goodman. *Treasurer*, E. H. Child. *Honorable Secretary*, W. Clement Williams, 13 Aked's Road, Halifax.

HAMPSTEAD PHOTOGRAPHIC CLUB.—Established 1887. Meets on second and fourth Mondays during the Winter months at the members' houses in turn, and once a month during the Summer. *Honorable Treasurer*, C. A. Watkins. *Honorary Secretary*, B. W. Wild, Gladesmore, Willesden Lane, N. W.

HARTLEPOOL AND DISTRICT PHOTOGRAPHIC SOCIETY.—*President*, Thomas Richardson, M. P. *Honorary Secretary*, C. J. Palmer, 2 Whitley street, West Hartlepool.

HASTINGS AND ST. LEONARDS PHOTOGRAPHIC SOCIETY.—Meetings are held on the second Monday in each month. *President*, Wilson Noble, M. P. *Vice-Presidents*, Lord Brassey of Bulkeley, K. C. B., Councillor Stubbs, J. H. Blomfield, S. W. Bultz, M. Sullivan, M. Wright, W. Mayor, W. Shuter, Dr. Routh, Rev. A. M. Macdona, Rev. A. B. Cotton. *Council*, Rev. A. M. Macdona, H. F. Bultz, M. Sullivan, T. W. Thomas, G. Bradshaw, W. Mayor. The president, treasurer and secretaries, belong to the Council *ex officio*. *Treasurer*, Rev. A. B. Cotton. *Joint Secretaries*, T. J. Northy, F. S. Sc. and A. Brooker.

HEREFORDSHIRE AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1888. Meetings, first Thursday in each month at 7:30 P. M. *President*, Jas. Rankin, M.P. *Honorable Secretary*, John Parker, City Surveyor, Mansion House, Hereford.

HOLBORN CAMERA CLUB.—Established 1887, under the name of "The Teachers' Photographic Society." Meet for outings the first Saturday, and for discussions the third Wednesdays in each month. Place of meetlng, 100 High Holborn, W. C. Annual general meeting for election of officers in April. *President*, W. Rice, 86 Fleet street. *Patron*, Rev. A. Johnson, M. A., F. L. S. *Council*, J. Colman, Oatlands Park Board School, Weybridge; A. Gill, 12 King Edward's Road, Hackney; D. R. Lowe, 37 Lorrimore Square, S. E.; A. Nunn, 48 Davisville Road, Shepherd's Bush, W. *Treasurer*, G. A. Freeman, B. Sc., F. G. S., 51 Danby street, Denmark Park, S. E. *Secretary*, Fred. Brocas, 86 Fleet street, E. C.

HUDDERSFIELD PHOTOGRAPHIC SOCIETY.—Meetings at Byram Buildings, Station street, 8 P. M.; first and third Wednesdays of each month. *President*, Surgeon-Major Foster. *Honorary Secretary*, H. M. Smith, 15 St. John's Road.

HULL AMATEUR PHOTOGRAPHIC SOCIETY.—Established 1884. *President*, Sir A. K. Rollit, M.P. *Vice-President*, C. F. Amos. *Council*, Edward Bolton, J. Chatham, E. H. Howlett, C. D. Holmes, J. Stothard, J. Walker. *Treasurer*, H. W. R. Smith, *Secretary*, D. W. Sissons, 84 Beverly Road, Hull.

HYDE PHOTOGRAPHIC SOCIETY.—Established 1885. Annual meeting, third Wednesday in October. Ordinary meetings, third Wednesday in each month from September to April inclusive. *President*, John Pennington. *Vice-President*, Dr. G. W. Sidebotham. *Committee*, F. W. Cheetham, F. Bland, Allan H. Hall, Henry H. Clayton, E. E. Dawson, H. Secker. *Auditor*, Percy Oldham and Harry Hall. *Treasuer*, John Hall Brooks. *Secretary*, William H. Middleton, 120 Hyde Lane, Hyde.

IPSWICH PHOTOGRAPHIC SOCIETY. Established 1888. The meetings of the Society are held in the Art Gallery, Ipswich, on the second Tuesday in each month except May, June, July. August, and September. *President*, J. Dixon Piper. *Vice-Presidents*, A. H. Cade and Frank Mason. *Committee*, N. Adlard, R. Cash, A. F. Penraven, J. C. Wiggin, F. Woolnough, A. C.

Churchman. *Hon. Secretary and Treasurer,* E. R. Pringle, 83 Berners Street,Ipswich.

KEIGHLEY AND DISTRICT PHOTOGRAPHIC ASSOCIATION.—Meetings at the Mechanics Institute. *President,* Major John Sugden, J. P. *Vice-Presidents,* Messrs. A. Keighley and C. Barton. *Treasurer,* W. E. Mariner. *Hon. Secretary,* J. Wm. Darling Mechanic's Institute, Keighley.

KENDAL LITERARY AND SCIENTIFIC INSTITUTION (PHOTOGRAPHIC SECTION).—Established 1886. Meetings are held in the Museum Library on the second Wednesday in each month at 7½ P. M. Annual meeting in September. Field meetings during the Summer months at convenient times. *Chairman,* F. W. Crewdson. *Committee,* Isaac Braithwaite, F. Armstrong, Hon. Secretary of the Institution, (J. Seavers), Chairman, Treasurer, and Secretary of Section. *Treasurer,* Samuel Rhodes. *Secretary,* Charles E. Greenall, Prospect Kendal.

LEWES PHOTOGRAPHIC SOCIETY.—Established 1888. Ordinary meetings are held on the first Tuesday in each month at the Glee Room, Cliffe, at 8 P. M. *President,* J. G. Braden. *Vice-President,* J. Tunks. *Committee,* D. Blagrove,Jr ., C. Corder, R. Morphew, P. Morris, H. Harvey Smith. *Hon. Secretary and Treasurer,* E. J. Bedford, 10 St. John's Terrace, Lewes.

LAMBETH POLYTECHNIC CAMERA CLUB.—*Treasurer,* Rev. Freeman Wills, M.A. *Hon. Secretary,* Thos. I. Bartrop. *Committee,* I. W. Coade, F. W. Kent, F. W. Levett, F. W. Maile, W. H. Powell, I. I. Woolnough. Ferndale Road, Brixton.

LEAMINGTON AMATEUR PHOTOGRAPHIC SOCIETY.—*President,* Surg. Gen. Raking. *Hon. Secretary,* F. M. Gowan, 20 Bauchamp square. *Committee,* Surg. Gen. Ranking, *Chairman,* Rev. H. G. Allfree, Rev. G. H. Shafts, Henry Champion, T. Latharn, F. M. Gowan, J. Rhodes, Esq., Rev. M. W. Gregory. Place of meeting: The Trinity Church Room, Morton street.

LEIDS Y. M. C. A. PHOTOGRAPHIC CLUB.—*President,* Godfrey Bingley, Esq. *Vice-Presidents,* G. H. Jackson and R. Brooks. *Committee,* J. W. Fisher, T. P. Goddard, F. Plews, R. H. Slade, E. S. I. Smith. *Hon. Secretary and Treasurer,* F. Scaife.

LEICESTER AND LEICESTERSHIRE PHOTOGRAPHIC SOCIETY.—Established 1885. Meets second Wednesday in each month at Mayor's Parlour, Old Town Hall, at 7½ P. M. Recess, June, July, August,

and September. Annual meeting for election of officers in January. *President*, George Bankart. *Vice-President*, S. S. Partridge. *Committee*, W. Sculthorp, W. T. Tucker, J. Weatherhead, A. W. Wilson. *Treasurer*, W. Sculthorp. *Secretary*, Henry Pickering, Highcross Street, Leicester.

LEITH AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1888. Meetings held on the last Tuesday of every month at 8 P. M. Annual General meeting, last Tuesday of January. *President*, William Dougall. *Vice-President*, W. F. Walker. *Council*, George Simpson, T. W. Dewar, R. C. Ewart, Robert Hunter, William Callender, Walter Ross, William Swanston, M. Campbell, Thomas Wilson. *Treasurer*, Alexander Pitkethly. *Hon. Secretary*, A. D. Guthrie, 7 Pitt Street, Leith.

LEEDS PHOTOGRAPHIC SOCIETY.—Re-established 1881. Meetings take place at 8 P. M. on the first Thursday in each month. unless otherwise arranged. Annual meeting, first Thursday in December. *President*, T. W. Thornton. *Vice-Presidents*, Thos. Dawson, B. T. McKay. *Committee*, T. Butterworth, W. Denham, G. Bingley, S. Kirkwood, Captain Plummer and the Officers of the Society. *Treasurer*, G. H. Rodwell, 44 Wade Lane, Leeds. *Secretary*, S. A. Warburton, 12 Waverly Terrace, Leopold street, London.

LEYTONSTONE PHOTOGRAPHIC SOCIETY.—*Hon. Secretary*, J. W. Spurgeon, Brayton Villas, Leytonstone.

LITERARY PHOTOGRAPHIC CLUB.—Established 1887. Founded for the circulation and exchange among the members of photographs of literary interest, or of places rendered celebrated by eminent persons. The Hon. Secretary would be glad to hear from any foreign amateur (American or otherwise) willing to exchange photographs of other countries for an equivalent number of English photographs. Views of almost any English place specially wished for might be obtained in exchange on application to him. *Hon. Secretary*, R. A. R. Bennett, B. A. Walton Manor Lodge, Oxford.

LIVERPOOL AMATEUR PHOTOGRAPHIC ASSOCIATION.—Established 1863. Meetings, last Thursday in each month, except December, at 6 P. M., held at the Club Rooms, Crescent Chambers North, 3 Lord St. *President*, A. W. Beer. *Vice-Presidents*, H. Lupton, Paul Lange. *Hon. Treasurer*, Jos. Earp. *Hon. Secretary*, W. A. Watts, M.A., Highfield Road,

Appleton-in-Widnes. Annual meeting, last Thursday in November.

London and Provincial Photographic Association.—Established 1882. Meetings held at Mason's Hall Tavern, Mason's Avenue, Bassinghall street, E.C., every Thursday evening at 8 o'clock. *Trustees,* J. Traill Taylor and J. B. B. Wellington. *Committee,* H. D. Atkinson, J. J. Briginshaw, F. P. Cembrano, J. T. Collins, E. Clifton, P. Everett, L. Medland, C. H. Trinks. *Curator,* A. Haddon. *Treasurer,* W. H. Prestwich. *Hon. Secretary,* F. A. Bridge, East Lodge, Dalston Lane, London, N. E.

London Social Camera Club.—Established 1887. Meetings are held on the first Wednesday in the month; also outdoor meetings as arranged. The club, being an offshoot of the London Social Cycling Club, was formed with the object of encouraging photography amongst cyclists more especially, but is not confined to riders. *Hon. Secretary,* Herbert Smith, 6 New Broad Street, E.C.

Longborough Literary Scientific Society.—Photographic Section. *President,* J. B. Colgrove M. A. *Vice-President,* W. C. Burdor. *Committee,* J. W. Taylor, Jr., C. H. Coltman, The President, Vice-President, and Secretary. *Hon. Secretaries,* W. Clarke, W. T. Tucker, Herrick Rd., Loughborough. Meetings second Thursday in each month at 8 o'clock, in Frost's Studio.

Maidstone Amateur Photographic Club.—*President,* J. E. Austen. *Honorary Secretary,* S. Bath. *Treasurer,* Major Wright. *Committee: Chairman,* E. Gwund, M. D., H. Bear, H. Bensted, W. Day, F. Laurence, J. Lowery, P. King, M. B., D. Welsh, M. D.

Manchester Amateur Photogrphic Society. Established 1358. Ordinary meetings held on the second Tuesday in each month, at the Manchester Athenæum. General meeting, last Tuesday in January. *President,* S. F. Flower. *Vice-Presidents,* J. Davenport, Rev. H. J. Palmer, M. A., H. Smith, William Stanley. *Committee,* T. M. Brook, G. J. Crippin, Charles Dawson, John Bathe, A. L. Bortock, R. O. Gilmore, John Macnamara, J. Stevenson, Geo. Wheeler, James Whitham. *Treasurer,* J. G. Jones. *Librarian,* James H. Seed. *Secretary,* F. W. Parrott, 41 Eagle street, C. on M., Manchester.

MANCHESTER CAMERA CLUB.—Established 1883. Meetings held at the Victoria Hotel on the third Wednesday in each month. *Committee*, J. F. Foster, J. G. Jones, J. W. Leigh, T. W. Stevenson, A. Sykess J. Whitham. *Honorary Secretary*, Thos. T. Sefton, Seedley Range, Pendleton.

MANCHESTER PHOTOGRAPHIC SOCIETY. — Established 1855. Meetings, second Thursday in each month throughout the year, at 36 George street. Lantern Section Meetings, fourth Wednesday from September to March. *President*, Sir Henry E. Roscoe, M. P. *Vice-Presidents*, Canon Beechey, John Schofield, Abel Heywood, Jr., Alan Garnett, J. S. Pollitt. *Council*, T. Chilton, H. Smith, W. Watts, Dr. W. G. Sidebotham, R. Atherton, C. F. Brenan, W. Broughton, T. R. Cobley, C. Estcourt, J. W. Leigh, *Lantern Committee*, Dr. Sidebotham, W. Broughton, C. F. Brenan, H. M. Whitefield. *Librarian*, John Schofield. *Treasurer*, W. G. Coote. *Honorary Secretary*, W. I. Chadwick, Brooklands, Manchester.

NEWCASTLE-ON-TYNE AND NORTHERN COUNTIES' PHOTOGRAPHIC ASSOCIATION.—Established 1881. Meetings held in the Mosley Street Café, Newcastle-on-Tyne, on the second Tuesday in each month, at 7:30 P. M., except May, June, July, August and September. *President*, Alexander S. Stevenson, J. P. *Vice-Presidents*, J. P. Gibson and H. R. Procter. *Council*, M. Auty, T. Galloway, H. C. Hemy, W. Parry, E. Schümann, L. Williamson, J. Brown, J. E. Goold, P. M. Laws, H. G. Ridgway. *Honorary Treasurer*, J. W. Robson, 12 Lisle street. *Honorary Secretary*, Edgar G. Lee, 3 Woodbine Road, Gosforth.

NORFOLK AND NORWICH PHOTOGRAPHIC SOCIETY.—Established 1888. General meetings, first and third Friday in each month from October to May inclusive, and first Friday in each month from June to September inclusive, at 8 o'clock. Annual general meeting, first Friday in March. *President*, F. W. Harmer, Mayor of Norwich. *Vice-Presidents*, W. H. Dakin, Samuel Hoare, M. P., G. J. Newbegin. *Committee*, B. Bullen, C. R. Crosskill, J. Griffin, T. W. Spalding. *Treasurer*, F. Howe. *Honorary Secretary*, Sparham Camp, Havelock Road, Norwich.

NORTH KENT AMATEUR PHOTOGRAPHIC SOCIETY.—The meetings are held on the second Thursday in each month at 8 P. M. *President*, J. C. Johnson, J. P. *Vice-President*, E. J. Wall,

Esq. *Honorary Secretary,* G. W. Cobham, 3 Edwin street, Gravesend.

North London Photographic Society.—Established 1885. The ordinary meetings are held on the first and third Tuesday in every month at Myddelton Hall, Islington, N. Excursions every Saturday afternoon from Easter to Michaelmas. *President,* J. Trail Taylor. *Vice-Presidents,* A. Mackie and E. Clifton. *Council,* J. Jackson, F. G. Reader, L. Medland, W. F. Coventon, Rev. E. Healy, A. C. Cassor, J. Oakley, W. Bishop. *Curator,* W. Few. *Honorary Secretary* and *Treasurer,* N. P. Fox, 2 Princess Terrace, Primrose Hill, N. W.

North Lonsdale Amateur Photographic Society.—*President,* Rev. J. Gregson. *Honorary Secretary,* F. P. Heath, Ainsworth street, Ulverston.

North London Photographic Society.—Established 1885. Ordinary meetings on first and third Tuesdays in each month, at Myddelton Hall, Islington, N. Excursions every Saturday afternoon, from Easter to Michaelmas. *President,* J. Traill Taylor; *Honorary Secretary* and *Treasurer,* N. P. Fox, 2 Princess Terrace, Primrose Hill, N. W.

North Middlesex Photographic Club.—Established 1888. Meetings, fortnightly, on Monday evenings at 7:30, in the Iron Room, Stout Green. *President,* John Humphries, F. S. A.; *Vice-Presidents,* H. Beckett and E. Traill Hiscock. *Council,* F. W. Hart, F. C. S., T. C. Lathbridge, W. A. Lavanchy, J. Saville, H. Walker. *Curator,* G. R. Martin, Harringay Park Granary, Green Lanes, Finsbury Park. *Treasurer,* E. Seymour Paul.

North Surrey Photographic Society. Established 1888.—Meets every alternate Tuesday at the West Norwood Constitutional Club, Norwood Road, S. E. *Committee,* W. H. Walker, L. Wolff, R. Crossthwaite, A. Rider, B. Wilkinson, G. R. Fludder. *Honorary Secretary* and *Treasurer,* Harold Senier, F. I. C., F. C. S., 88 Norwood Road, S. E.

Nottinghamshire Amateur Photographic Association.—Established 1883. Club rooms, Cavendish Chambers, 19 Market street. Ordinary meetings, alternate Mondays at 8:00 o'clock. Annual meeting first Monday in October. Dark room. *President,* Henry Blandy, L.D.S. (Edin.). *Vice-Presidents,* G. A. Bull and S, Wells. *Committee,* W. Burrows, T. Carnell, Dr. W

T. Crew, W. J. Collings, J. F. Lewis, J. C. Lancaster, A. Pickard, J. Spray, H. Turton, H. A. A. Wigley, G. E. Williamson, S. W. Woodroffe. *Treasurer*, B. Sturges Dodd. *Secretary*, P. E. Knight, 39 Burford road, The Forest, Nottingham.

OLDHAM PHOTOGRAPHIC SOCIETY.—Established 1867. All meetings are held at the Lyceum, Union street, Oldham. Monthly meetings on the last Thursday in each month, in the Club Rooms, at 7:45 P.M. Weekly meetings every Thursday evening, in the Society's room from 8 to 10. The annual meeting is held on the last Thursday in October. *President*, John Greaves, Jr. *Vice-President*, Tom Heywood. *Council*, John Chadwick, John William Cooper, Edward H. Dixon, John Fullalove, James Hall, James Henry Prestwitch, Wallace Thompson. *Librarian*, Moses Piper. *Treasurer*, John William Whitehead. *Secretary*, Thomas Widdop, 16 Burnaby street, Oldham.

OXFORD UNIVERSITY PHOTOGRAPHIC CLUB.—Established 1884. Meetings held at 8:00 o'clock, every other Thursday or Friday during term in the club rooms. *President*, G. S. Edwards, 16 Crick road. *Committee*, E. W. H. Evers (Christ Church), A. A. Jackson (Magdalen), J. B. Allan (Oriel).

PAISLEY PHOTOGRAPHIC SOCIETY.—Re-established 1885. Monthly meetings at 8:00 P.M., in Paisley Museum, first Tuesday in each month from October till April inclusive. *President*, H. H. Smiley. *Vice-President*, Robert Harris. *Council*, James Donald, Alexander Fullerton, George Robertson, Thomas Rustall. *Treasurer*, Matthew Morrison. *Secretary*, Robert Cairns, Castlehead, Paisley.

PEOPLE'S PALACE PHOTOGRAPHIC CLUB.—Established 1888. Ordinary meetings are held on the first and third Fridays in the month, at 8:00 P.M. Outdoor excursions every other Saturday during the Summer months. Annual meeting in September. *President*, Sir Edmund Hay Currie. *Vice-Presidents*, E. Howard Farmer, F. C. S., F. I. C., C. W. Hastings, Robert Mitchell. *Committee*, Messrs. Albu, R. Beckett, Downing, Gamble, Hawkins, Lawday, Marriott. *Librarian*, W. Ludlow, 68 Jamaica street, Stepney, E. *Hon. Secretary and Treasurer*, William Barrett, 16 Clare road, Forest Gate, E.

PETERBOROUGH PHOTOGRAPHIC SOCIETY.—Established 1887. Meetings first Monday in each month. General meeting first Monday in June. *President*, Dr. G. Kirkwood. *Vice-Presidents*,

The Very Rev. the Dean, Rev. Canon Argles, Dr. T. J. Walker, J. P., Dr. J. M. Kennedy, J. H. Hetley, J. H. Pearson, E. Worthington. *Hon. Secretary,* A. W. Nichols, 11 Cromwell Road. *Hon. Treasurer,* D. Gray, Westwood road.

PHOTOGRAPHERS' BENEVOLENT ASSOCIATION.—Established 1873. Meetings as required. *President,* J. Traill Taylor. *Committee,* William Bedford, *Chairman,* T. J. Collins, *Deputy Chairman,* H. D. Atkinson, F. H. Berry, W. F. Benham, T. Bolas, J. J. Briginshaw, E. Clifton, T. E. Freshwater, W. J. B. Humphreys, H. G. White, J. Zaehnsdorf, F. W. Cox, G. T. Harris, E. A. Whittemore. *Auditors,* J. S. Rolph and Alexander Mackie. *Honorary Solicitor,* W. F. Benham. *Trustees,* Captain W. de W. Abney, R.E., F.R.S., and W. S. Bird. *Treasurer* John Stuart, 112 New Bond street, W. *Central Secretary,* H. Harland, 83 Hawksley road, Stoke Newington, N. *Honorary Local Secretaries,* Bath: H. J. Walker, 8 Broad street; Brighton: F. Hambly, 69 Upper Lewes Road; Bristol: T. Protheroe, 35 and 36 Wine street; Derby: R. Keene, All Saints'; Glasgow: J. Davie, 186 Sauchiehall street; Huddersfield: H. M. Smith, 20 John William street; Newcastle: J. B. Payne, Moseley street; Norwich: J. Howie, 85 St. Giles' street; Plymouth: J. E. L. Brokenshire, 48 Hotham place, Millbridge; Sheffield: T. S. Hicks, 141 Cemetary road; Shrewsbury: J. Pyefinch, Mardol Head.

This Association was established in 1873, having for its object the organization of the benevolence of Photographers, as a class, and thereby to afford temporary or permanent assistance to those members, their widows and children being is necessitous circumstances, arising from age, sickness, or misfortune, by granting annual pensions, and by giving immediate pecuniary grants in urgent cases to duly qualified applicants, and to aid the unemployed members in obtaining situations.

PHOTOGRAPHIC CLUB.—Established 1879.—Meetings every Wednesday night at eight o'clock. Annual meeting on the first Wednesday in November. *Trustees,* William Ackland and T. Charters White. *Committee,* W. Bedford, F. A. Bridge, W. Cobb, E. W. Foxlee, A. Mackie, J. Nesbit, J. B. B. Wellington, J. W. Zaehnsdorf. *Curator,* H. M. Hastings. *Librarian,* Eugar Clifton. *Treasurer and Secretary,* Edward Dunmore, 83 Corinne Road, Tufnell Park, London, N.

PHOTOGRAPHIC CONVENTON OF THE UNITED KINGDOM.—Estab-

lished 1886.—*President*, A. Pringle. *Council*, W. Bedford, W. Cobb, W. England, S. G. B. Wollaston, F. A. Bridge, J. R. Gotz, F. P. Cembrano, H. M. Hastings, J. B. B. Wellington, W. H. Walker, J. Traill Taylor, J. W. Whitehead, W. W. Naunton, C. H. Bothamley, W. Lang, Jr., G. W. Webster, A. Cowan, R. Keene, W. H. Prestwich, G. Mason, J. M. Turnbull, A. Tate, W. Jerome Harrison, A. Werner. *Treasurer*, S. G. B. Wollaston. *Secretary*, J. J. Briginshaw, 128 Southwark street, London, S. E. The next meeting will be he held in St. James' Hall, London, in August, 1889.

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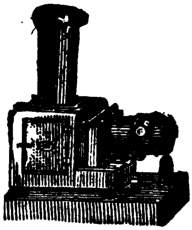

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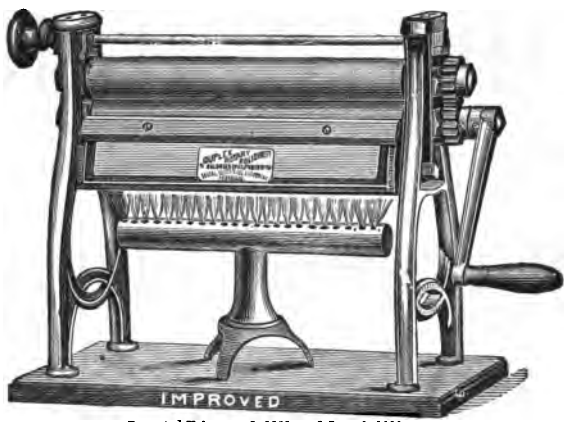

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158—The Music of the Birds.
159—In Welsh and English.
160—Come Across.
161—The Shortest Way in Summer Time.
162—The Stream in Summer.
163—A Chat with the Miller.
165—Feeding the Calves.
167—The Water Rat.
168—He never told his Love.
169—Creigiog Mill.
170—The Mill Door.
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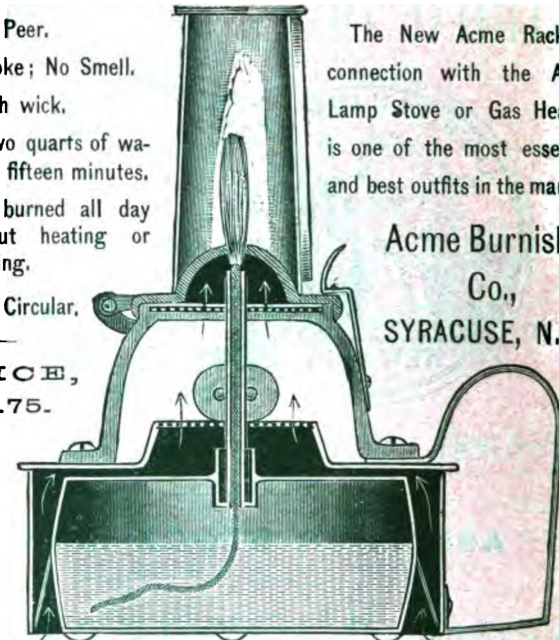

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15x12	6 10 0	8 0 0	1 7 6	1 5 0
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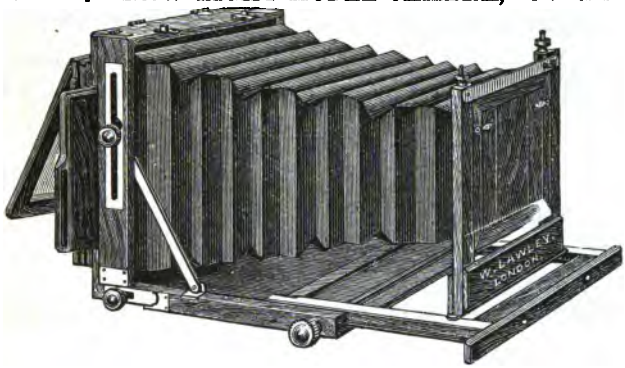

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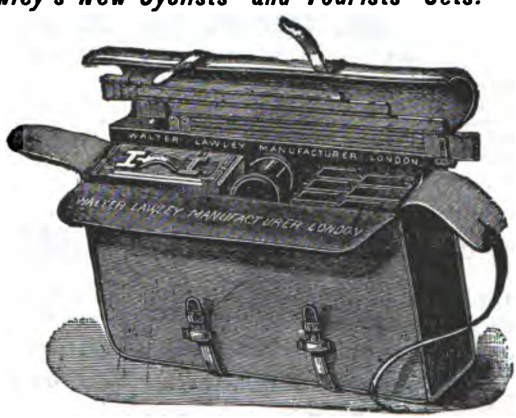

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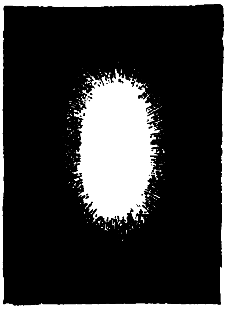

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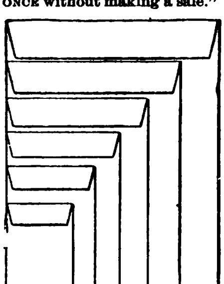

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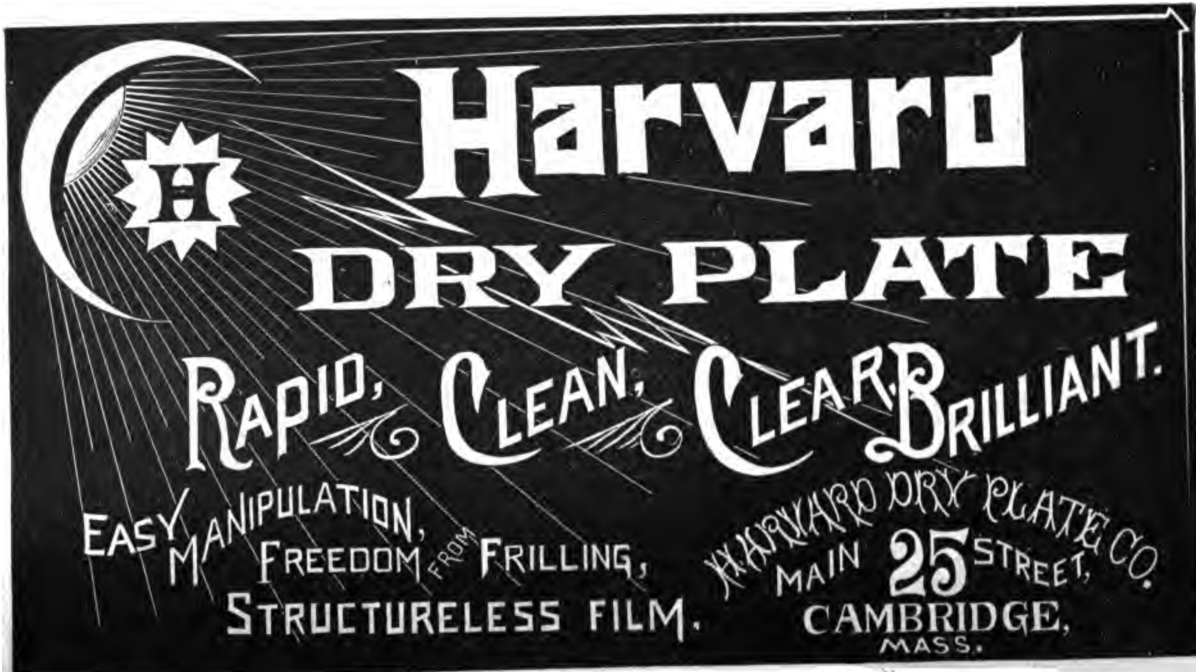
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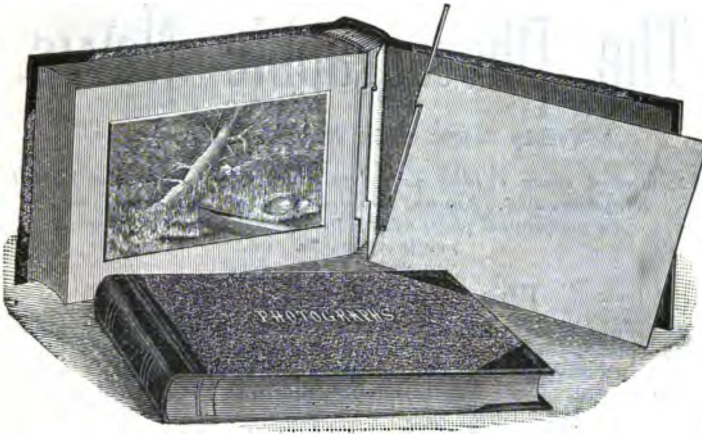

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OPALINE MATERIALS, Prices per Gross.

Reference Letter for Description of Goods.	SQUARE SIZES. Reference Number for Size.	4½ X 3 or smaller	6 X 4	6⅝ X 4¾	8⅛ X 5¼	8 X 6	9 X 7	11 X 7½	12 X 9½	15 X 11 21oz Glass ¼ in. bev.
		1	2	3	4	5	6	7	8	9
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
A	Beveled Glasses	0 10 0	0 14 0	0 16 0	1 1 0	1 2 0	1 8 6	1 16 0	2 10 0	4 10 0
B	Back and strut, cloth lined, and fitted with tape and ring	0 7 6	0 10 6	0 12 0	0 14 0	0 16 0	0 19 6	1 5 0	1 10 0	2 2 0
C	Backs lined with leatherette and strut, and fitted with tape and ring	0 6 6	0 8 9	0 9 6	0 11 0	0 11 9	0 12 6	0 18 0	1 0 0	1 12 0
D	Boxes, Fancy Red Embos'd	0 6 3	0 7 6	0 8 6	0 11 0	0 12 0	0 14 6	0 16 6	1 2 0	1 12 0
E	Boxes, White Cardboard ..	0 5 6	0 6 6	0 7 6	0 9 6	0 10 6	0 12 6	0 14 0	0 18 0	1 7 0
F	Complete Beveled Glasses, cloth backs and fancy boxes	1 3 9	1 12 0	1 16 6	2 6 0	2 10 0	3 2 6	3 17 6	5 8 0	8 4 [illegible]
G	Complete Beveled Glasses, leatherette backs and white boxes	1 2 0	1 9 3	1 13 0	2 1 6	2 4 3	2 13 6	3 8 0	4 8 0	7 9 0
Extras.	Metal Spring Mora Standard, superior make, Upright..............	0 13 0	0 17 0	0 18 0	1 1 0	1 1 0	1 6 0	2 10 0	2 14 0	4 10 0
"	Do. do. Lengthwise...	0 10 0	0 13 0	0 15 0	0 17 0	0 17 0	1 0 0	1 1 0	1 12 0	2 10 0
I	Cotton Wool Pads, cut to size	0 1 0	0 1 0	0 1 9	0 2 6	0 3 0	0 3 9	0 4 6	0 5 0	0 7 6
J	Gilt Edge Beveled Glasses, ⅛ inch beveled and gilt.........	1 0 0	1 6 0	1 8 0	2 12 0	3 5 6	3 10 0	5 5 0	7 10 0	----
K	Do do. ¼ inch beveled and gilt..............	1 12 0	2 10 0	2 16 0	3 14 0	4 0 0	5 0 0	6 12 0	9 0 0	----

10 per cent. added upon above Prices if less than half gross of any given size is ordered. Special Quotations for Orders of twenty-five gross of any given size, and upwards. Any size can be supplied at a small increase on the proportionate price.
1 sample View, mounted and finished complete, sent to any address on receipt of 1/.

[See preceding page.

ROOKE'S Simplex Automatic PRINT WASHER.

Patent 838.

This Apparatus will be found to do its work effectually, being simple with no complications, the prints being kept in circular motion. The Washer being provided with a syphon check will not allow the water to be all drawn off, allowing the Prints to float and thus prevent them sticking together. The bottom of bath is cone shaped, highest in center.

Advantages.—1. Self Acting. 2. Prints will not stick together. 3. Requiring no attention. 4. Saving of time. 5. Action continuous. 6. Prints are not injured by rushing flow of water.

12-in. diam.	10s. 6d.	20-in. diam.	20s. 6d.
16 " "	14s. 6d.	25 " "	27s. 6d.

Tubes to connect Water Tap, 1s. and 1s. 3d. each. White Enamel inside, extra. Larger if required.

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JOHN H. DALL,

Photographic **SUPPLIES.** Established 1850.

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E. VELTFORT,

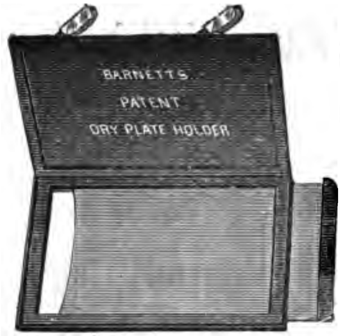
MANUFACTURER OF

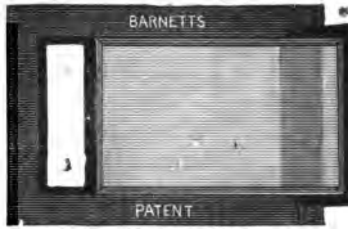
PAPER MATS

For Photographers and Frame Makers.

252 BOWERY, NEW YORK.

A large variety of Paper Mats from 4 x 5 up to 25 x 30 constantly on hand. Odd sizes made to order at short notice.





BARNETT'S

Patent Dry Plate Holder, with or without Patent Film Carrier.

SEVENTH YEAR.

This Holder weighs, for a plate measuring 6½ x 8½ inches, only 5 ounces. It is by far the lightest efficient Dry Plate Holder in the market. It is in no sense of the word an experiment, having been in use for both OUT DOOR and gallery work for six years, and is now in use by many professionals and amateur photographers, a few of whose names will be found below.

The FILM CARRIER is a recent addition to the Plate Holder, and is intended to render the Plate Holder available for either the plate or the film, as may at the time of using be desired by the photographer. It adds but little to its weight, and holds the film as flat and closely to its proper place as though it were glass.

The following sizes are offered. Any size will be made.

BARNETT'S PATENT DRY PLATE HOLDERS.

	Price per Doz.
3¼ x 4¼,	$6 00
4 x 5,	6 00
4¼ x 5½,	7 00
4½ x 6½,	8 00
5 x 7,	8 00
5 x 8,	8 00
6½ x 8½,	12 00
8 x 10,	15 00
10 x 12,	24 00

BARNETT'S PATENT UNIVERSAL FILM CARRIERS.

	Price per Doz.
3¼ x 4¼,	$2 00
4 x 5,	2 00
4¼ x 5½,	2 25
4¼ x 6½,	2 50
5 x 7,	2 75
5 x 8,	2 75
6½ x 8½,	3 25
8 x 10,	4 00
10 x 12,	5 00

BARNETT'S FILM CARRIERS.

	Price per Doz.
3¼ x 4¼,	$1 30
4 x 5,	1 40
4¼ x 5½,	1 40
4¼ x 6½,	1 60
5 x 7,	2 00
5 x 8,	2 00
6½ x 8½,	2 25
8 x 10,	2 50
10 x 12,	4 00

Inasmuch as this Plate Holder is much thinner and in all measurements smaller than the Holders made of wood, in ordering the exact OUTSIDE measure of Holder in use must be sent, that a Carriage in which to place this Holder may be made to fill the space occupied by wooden Holder, and at the same time carry this Holder. To avoid errors in measurement, it is recommended that one of the wooden Holders be sent either by mail or express, in which case I will assume all responsibility as to exact fit and proper focus. This Carriage and Ground, or Focusing Glass, will be charged for at cost.

The following unsolicited certificate from a well known amateur is offered as evidence of the practical value of this great improvement:

NEW YORK, March 5, 1889.

MR. JNO. BARNETT:

Dear Sir: For the past 6 years I have used your Holder for all work out doors as well as in doors. It is lighter than any Holder that I know possessing any value; is durable and LIGHT tight.

Your recently patented Film Carrier does its work to perfection.

Yours, &c., CHAS. WAGER HULL.

The following professional and amateur photographers have these Holders in use. More might be named if more were needed.

GEO. G. ROCKWOOD,
PACH BROS.,
W. KNOWLTON,
LANGILL & DARLING,
PROF. CROMWELL,
EDWARD BIERSTADT,
DR. H. G. PIFFARD,
DAVID WILLIAMS.

To be had through leading stock dealers. If not, orders may be sent direct.

JOHN BARNETT, Manufacturer and Patentee,
766 Broadway, New York.

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[*See following pages.*